Fire Weather Annual Report
Southeast Idaho
2012

Pocatello Fire Weather Office
Pocatello, Idaho

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service

2012 Fire Weather Annual Report

National Weather Service – Pocatello Fire Weather Office

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National Weather Service
Weather Forecast Office Pocatello
1945 Beechcraft Ave.
Pocatello, ID 83204

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1. Introduction:

The National Weather Service, Weather Forecast Office at Pocatello, Idaho has Fire Weather Forecast responsibility for portions of Idaho serviced by the Central, Eastern and Southern Interagency Dispatch Centers (Figure 1). The Pocatello Fire Weather Office produces this Annual Fire Weather Report. Previous reports are maintained up to five years.

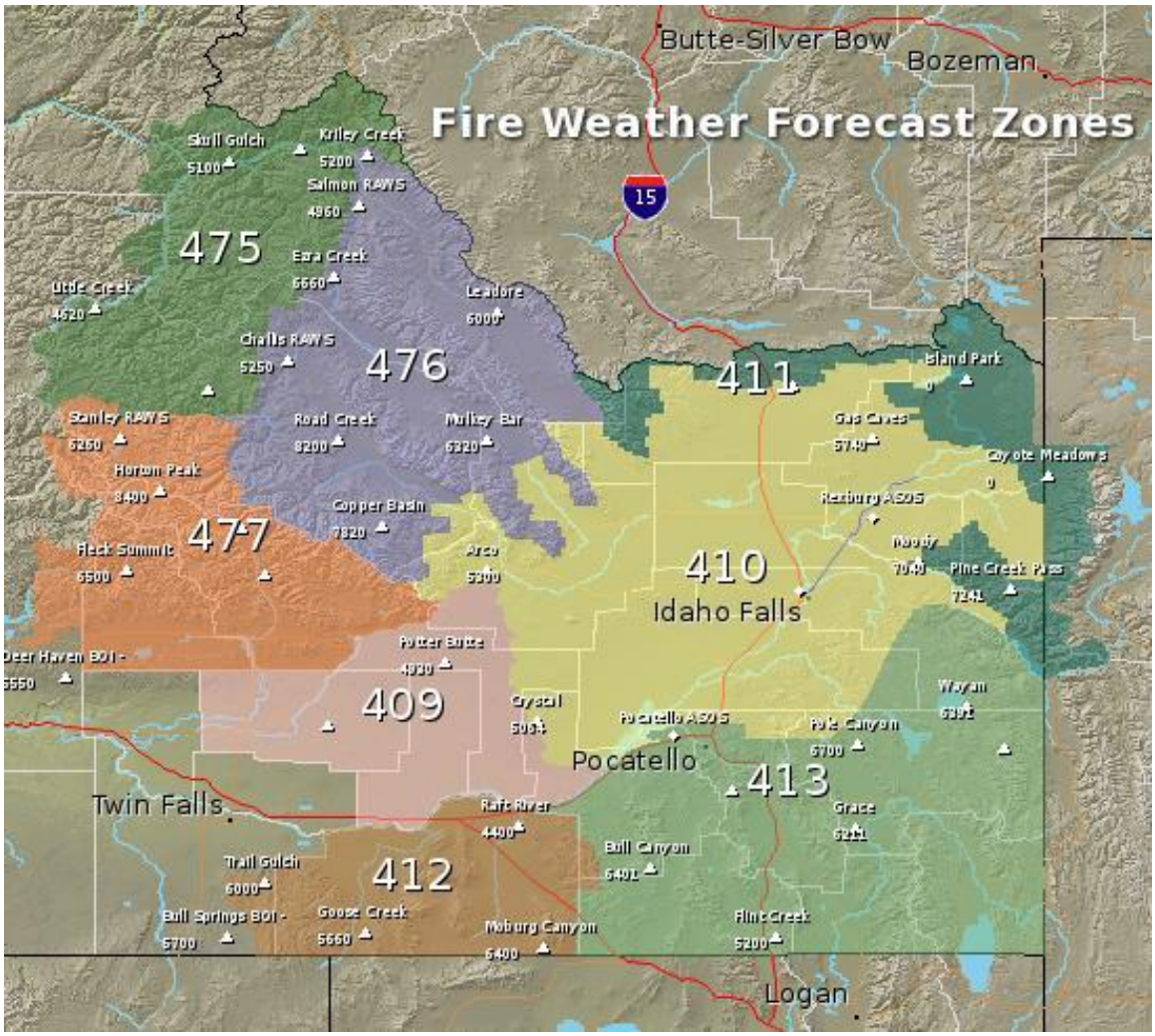

Figure 1 WFO Pocatello Fire Weather area of responsibility (solid color areas).

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2. Overview of the fire season:

The El Niño/Southern Oscillation Index (ENSO) indicated that water temperatures in the central and eastern equatorial Pacific showed a cooling trend beginning around August of 2011. This was the beginning of a back-to-back La Niña event, following a brief neutral period over the summer. This second La Niña event was not as strong as the first. The La Niña pattern gained strength during September and October, then flattened out into a weak to moderate event that continued through January of 2012 and finally dissipated by April. The El Niño/Southern Oscillation Index remained neutral through the summer months. A La Niña pattern typically favors persistent high pressure centered in the Gulf of Alaska with individual storm systems either tracking north of the high then dropping southeast to Idaho; or westerly winds which undercut the high and bring storm systems directly off the Pacific to Idaho. Other than this being a back-to-back La Niña event, the similarities ended quickly.

The El Niño/Southern Oscillation (ENSO) cycle occurs over a two to seven year period and refers to conditions of sea surface temperatures in the tropical Pacific Ocean. Researchers have identified other cyclic patterns besides ENSO around the globe that may affect long term weather patterns. Some of these cyclic patterns may span 10 or even 30 years. La Niña (colder than normal) and El Niño (warmer than normal) are terms associated with extremes in the ENSO cycle. The ENSO cycle has a strong influence on global climate patterns and is a major player in long term climate outlooks.

The observed storm track for October through Thanksgiving, 2011 looked promising with several early season storm systems tracking across the Gulf of Alaska and on to Idaho where above normal precipitation was observed. By the end of November, a strong ridge of high pressure took up station in the Northeastern Pacific Ocean. The storm track was shifted well to the north through Canada, leaving Idaho in an extended cold and dry period until the last week of December.

Significant changes began in January with the storm track becoming westerly, bringing relatively warm and moist air off the Pacific. A few embedded storm systems and fairly persistent west winds resulted in rapid recovery from near record low mountain snow pack, especially the western slopes of the central mountains and eastern highlands. Through February and March, successive storm systems showed and increased amplitude of the wave pattern, resulting in more warm southerly flow ahead of each storm system and rising snow levels. This became the main story for the remainder of the winter-spring months.

Basin averaged precipitation, as reported by the SNOTEL observation network (Figure 2.1a), got off to an excellent start in October 2011, followed by an extended dry period and below normal precipitation (Figure 2.2a) late November and December as high pressure became established in the Northeastern Pacific. A fairly active storm pattern the remainder of the spring resulted in liquid water equivalent of the precipitation close to normal, at least in the mountains. Late winter and spring storm systems embedded in predominately westerly flow showed a pronounced orographic influence for the west

facing slopes of the Salmon-Challis and Targhee National Forest areas. The on again off again winter storm pattern followed by temperatures 1 to 3F degrees above normal (Figure 2.1c) and elevated snow levels early in the spring resulted in mountain snow packs well below average (Figure 2.1b). As of the middle of March, snow packs across southeast Idaho were highly variable. The Salmon, Henry's Fork, Teton, Snake Basin above American Falls, and Big Wood Basins faired the best with 75 to near 100 percent of average snow pack. The Little Lost, Little Wood, and Bear River Basins received only 50 to 70 percent of average snow packs. The important implication for the fire season to follow can be seen from the early peak and rapid loss of snow pack at Morgan Creek SNOTEL site located roughly half way between where the Halstead and Mustang Fires occurred (Figure 2.3). The snow pack peaked in March, about 2 weeks early and the runoff concluded by the third week of April, almost 5 weeks ahead of an average year.

Several months of above normal temperatures and below normal precipitation contributed to an early start of the fire season. Precipitation measurements at The National Weather Service Office in Pocatello from February through July, 2012 showed a 6 month deficit of 1.96 inches when compared to normal (Figure 2.4) and for the water year ending September 30th, Pocatello was 2.22 inches below normal (Figure 2.5). For Red Flag purposes, the fuels in Idaho Fire Weather Zones 409 and 412 were first designated as critical on June 6th. By June 28th fuel conditions were also critical in zones 410, 411, 413 and 476. Fire weather zone 477 followed on July 7th and zone 475 by August 8th.

Dry westerly winds prevailed through much of June and early July. Between June 17th and July 3rd, Red Flag Warnings were issued on 7 different days for strong gusty winds and low relative humidity. These conditions developed on multiple days in the Snake Plain, Caribou-Targhee Forest, southern portions of the Sawtooth Forest and Twin Falls BLM District.

The first round of thunderstorms associated with the southwest area monsoon occurred July 6th and affected the Sawtooth and Challis Forest area. This was slightly ahead of the more typical July 15th to September 15th time period of the monsoon. Moist air associated with the monsoon surged northward ahead of a Pacific low pressure disturbance that affected all of southeast Idaho July 15-17th. Widespread precipitation of .5 to .75 inch blanketed the area. Otherwise, July through the first week of September saw frequent and alternating periods of strong and dry westerly winds switching to mainly dry thunderstorm type events. Red Flag conditions were met in southeast Idaho on a total of 43 different days this fire season and exceeded the previous record number of Red Flag days for southeast Idaho which was 32 set in 2000[1].

A fire season ending event likely came in pieces this year. A low pressure disturbance October 16-17 brought up to .25 inch precipitation with some high elevation snow. A more significant Pacific storm occurred October 23-25 that brought .25 to .5 inch precipitation across Southeast Idaho with mixed rain and snow in the lower valleys.

[1] Red Flag crieteria in Southeast Idaho have changed 4 times since the year 2000, and are not necessarily comparable.

Finally, November 9-10 a storm system brought up to 3 inches of snow to the lower valleys and 4 to 9 inches of snow in the mountains.

The expansion of drought conditions over the course of the fire season can be seen in the Keetch-Byram Drought Index; a measure of short term drought; i.e., evapotranspiration and near surface soil moisture content (Figure 2.6a). The Index for most of Southeast Idaho increased sharply to 400 or better by the last week of September (Figure 2.6b).

The Palmer Drought Severity Index measures more long term meteorological conditions over several months. Near the peak of fire season, the Palmer Index (Figure 2.7) shows moderate or greater drought conditions had developed across all of southeast Idaho. This was true even in the Bear River Basin where the highest snow pack ever recorded by the NRCS in that area occurred during the winter of 2010-11. It would appear that the ample stream flow and surface water storage of that year had run its course.

Compared to the past 13 years of Red Flag Event verification, thunderstorm activity was well above average this year and judged to be significant (greater than 15% of aerial coverage) on 23different days this fire season between the first week of July and the first week of September (Figure 2.8). Seventeen out of the 23 days were characterized as "dry" thunderstorms producing less than .10 inch rainfall.

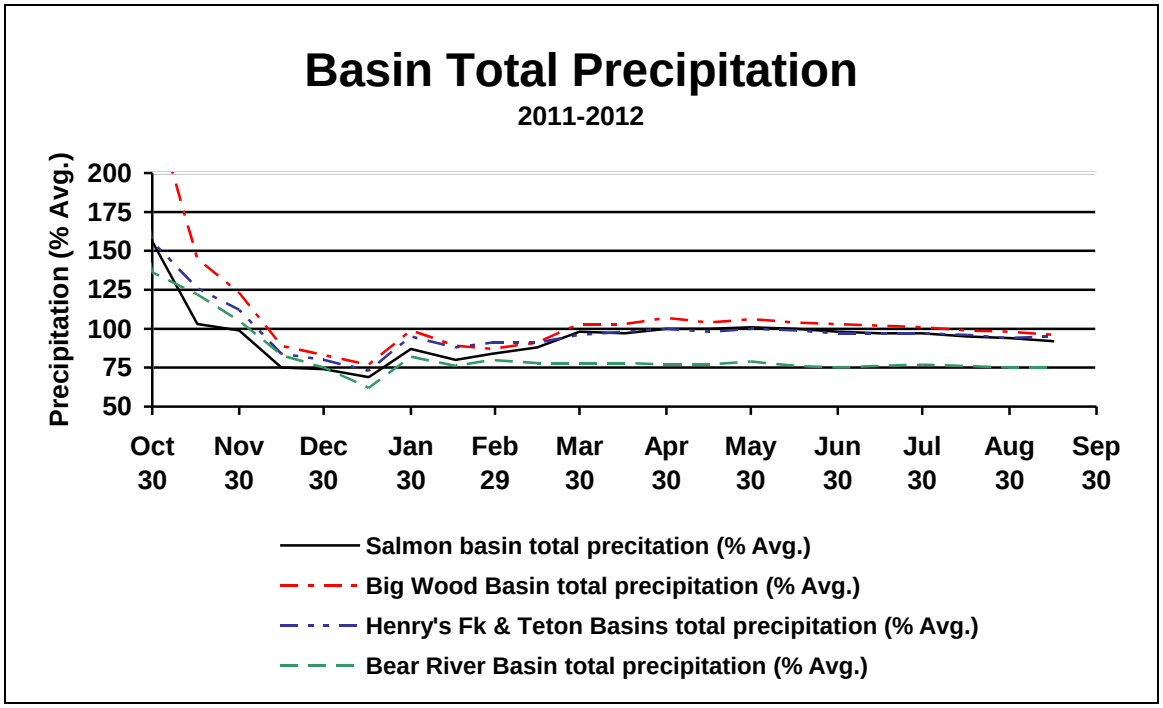

Figure 2.1(a) Total precipitation for select Southeast Idaho Basins expressed as a percent of average. From USDA Natural Resources Conservation Service, National Water and Climate Center, Portland Oregon.

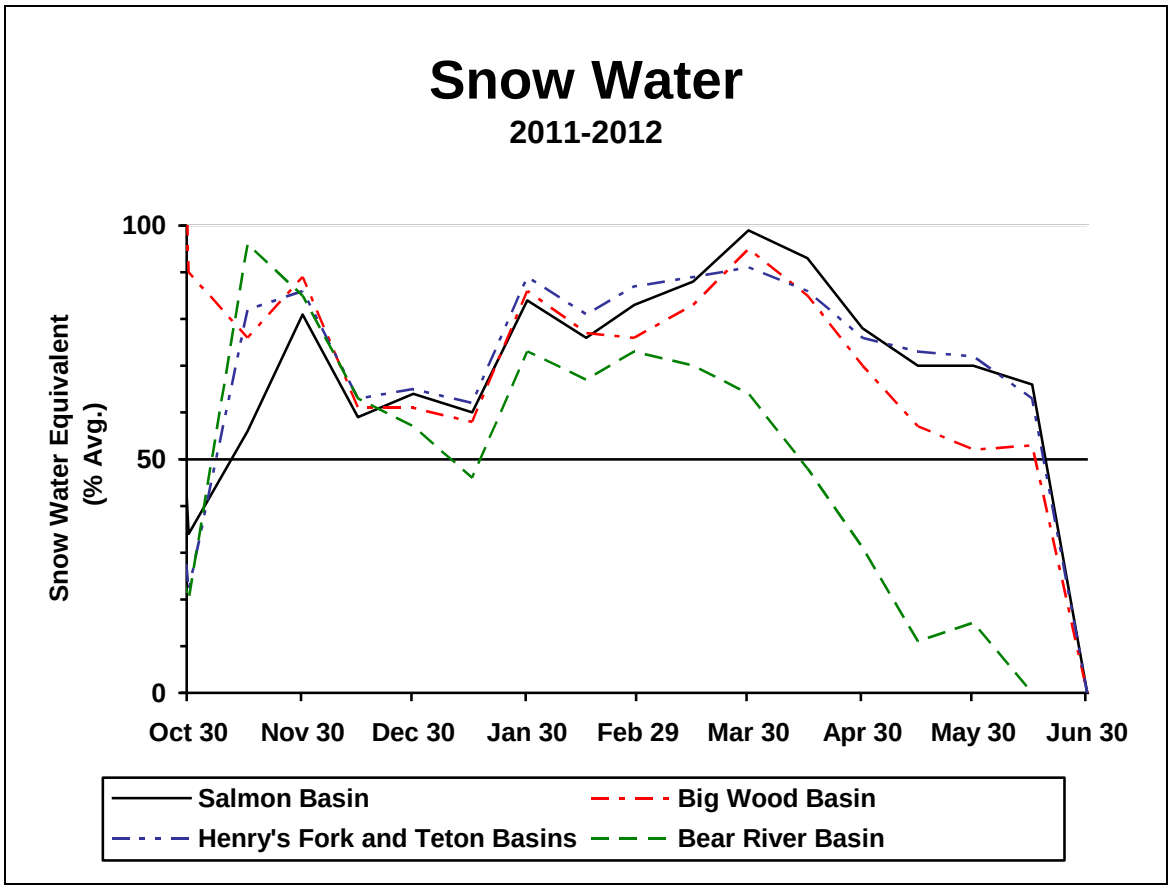

Figure 2.1(b) Snow water equivalent for select Southeast Idaho basins. From USDA Natural Resources Conservation Service, National Water and Climate Center, Portland Oregon.

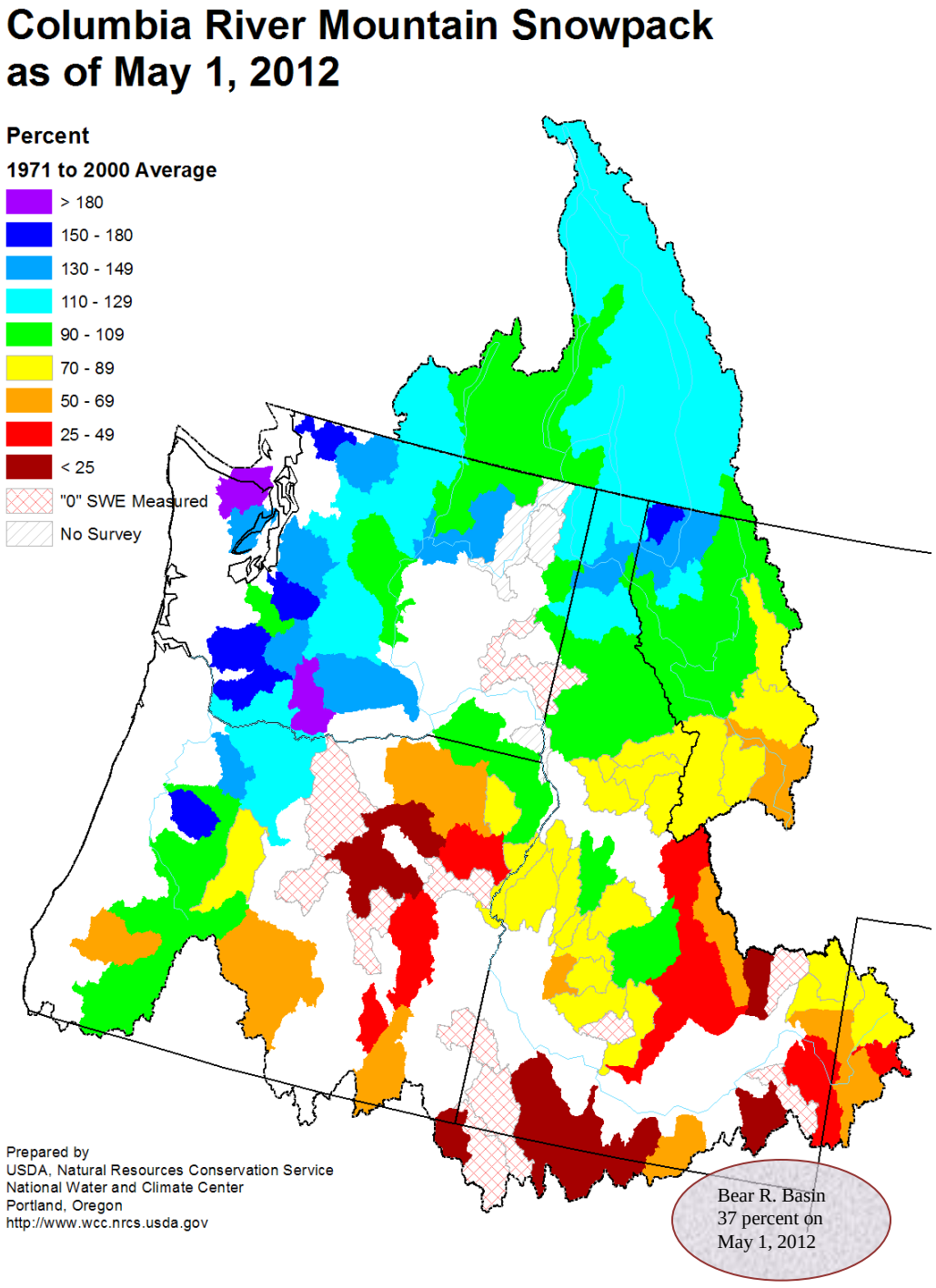

Figure 2.1c Mountain snow packs as determined from snow water equivalent. From USDA Natural Resources Conservation Service, National Water and Climate Center, Portland Oregon.

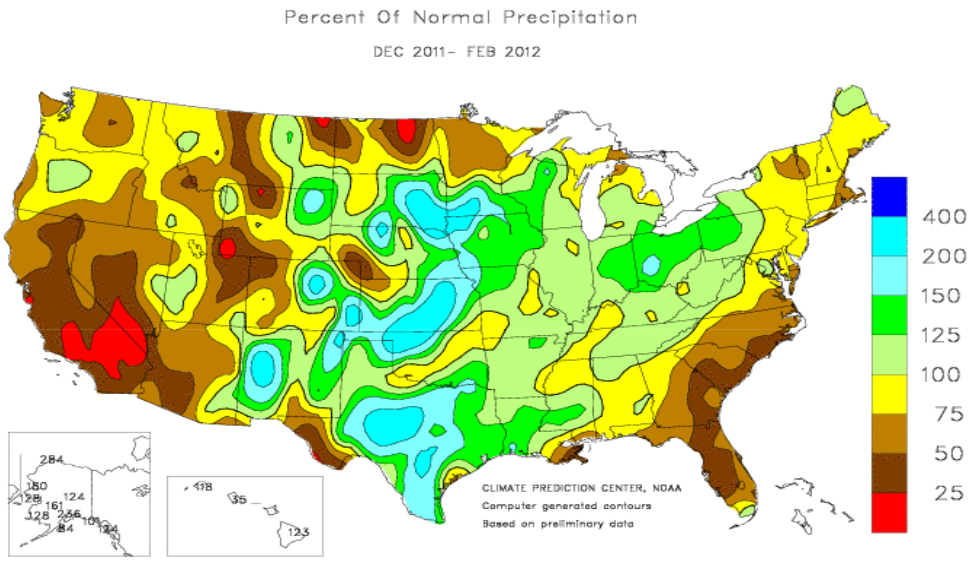

Figure 2.2a Precipitation as a percentage of normal for a 90 day period centered on January 2012, from Climate Prediction Center, National Oceanic and Atmospheric Administration.

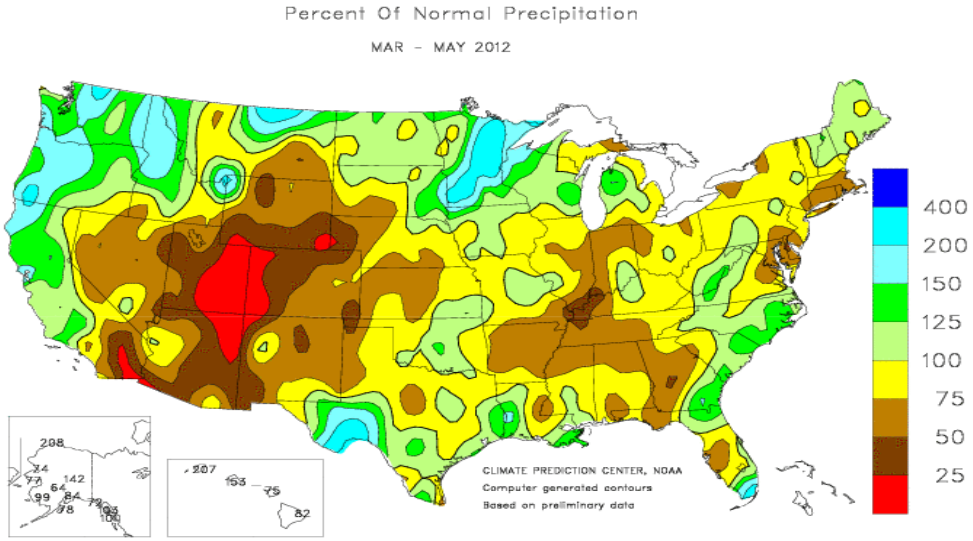

Figure 2.2b Precipitation as a percentage of normal for a 90 day period centered on April 2012, from Climate Prediction Center, National Oceanic and Atmospheric Administration.

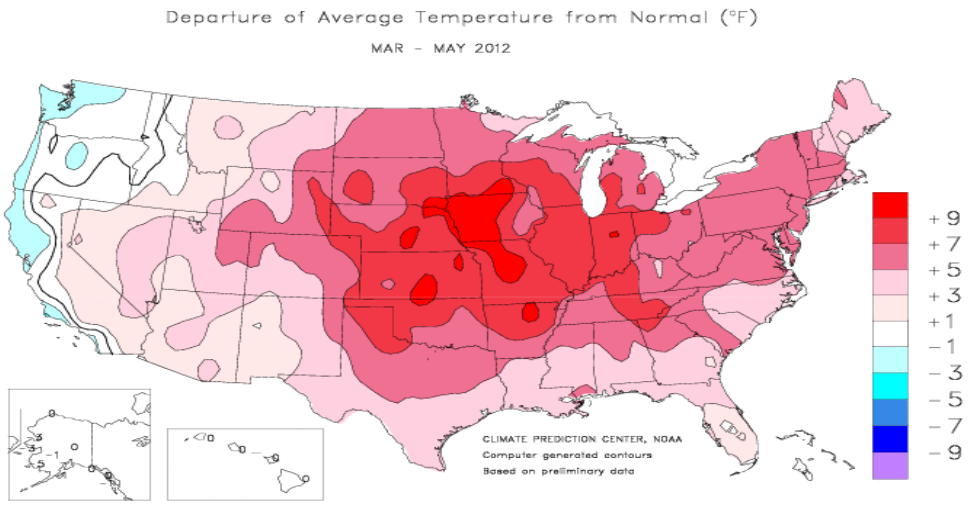

Figure 2.2c Temperature departure from normal for a 90 day period centered on April 2012, from Climate Prediction Center, National Oceanic and Atmospheric Administration.

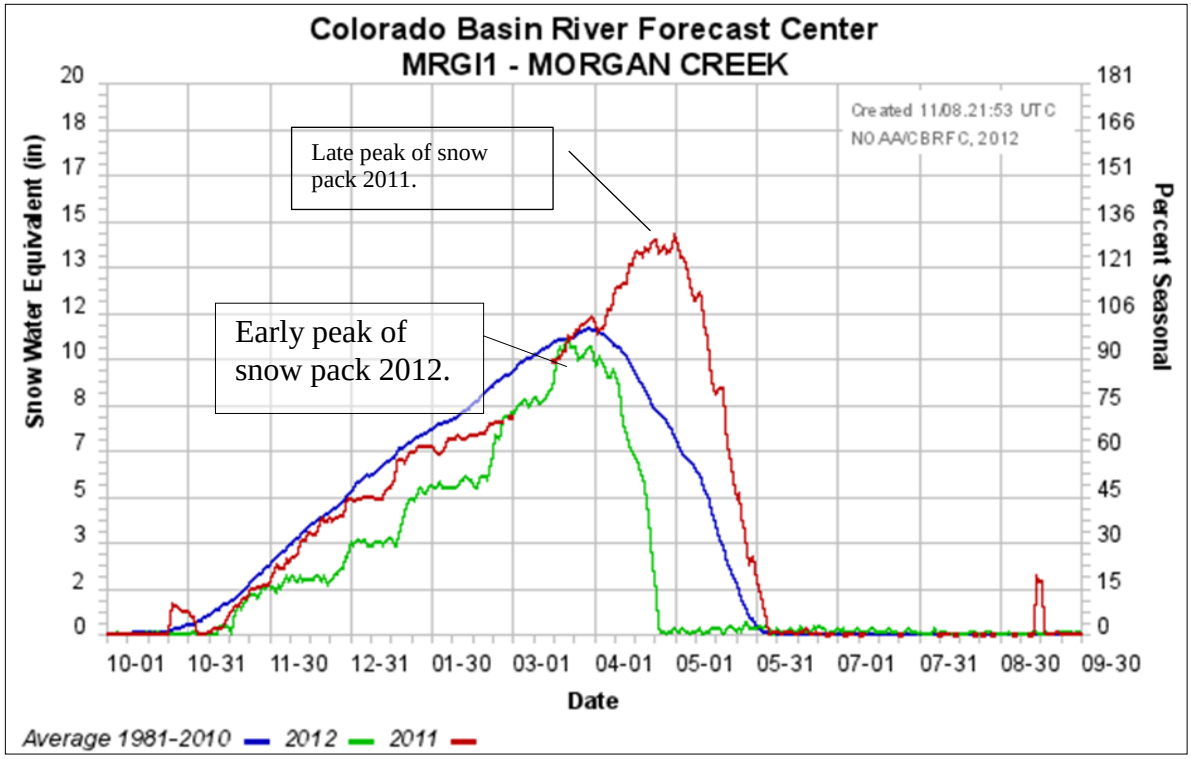

Figure 2.3 Late peaking snow packs of 2011 compared with the earlier than average peak of 2012; from the National Weather Service, Colorado Basin River Forecast Center. Morgan Creek is a telemetered snow reporting station of the National Resource Conservation Service, located at 7600 feet elevation on Morgan Creek Road about 24 miles north of Challis, Idaho.

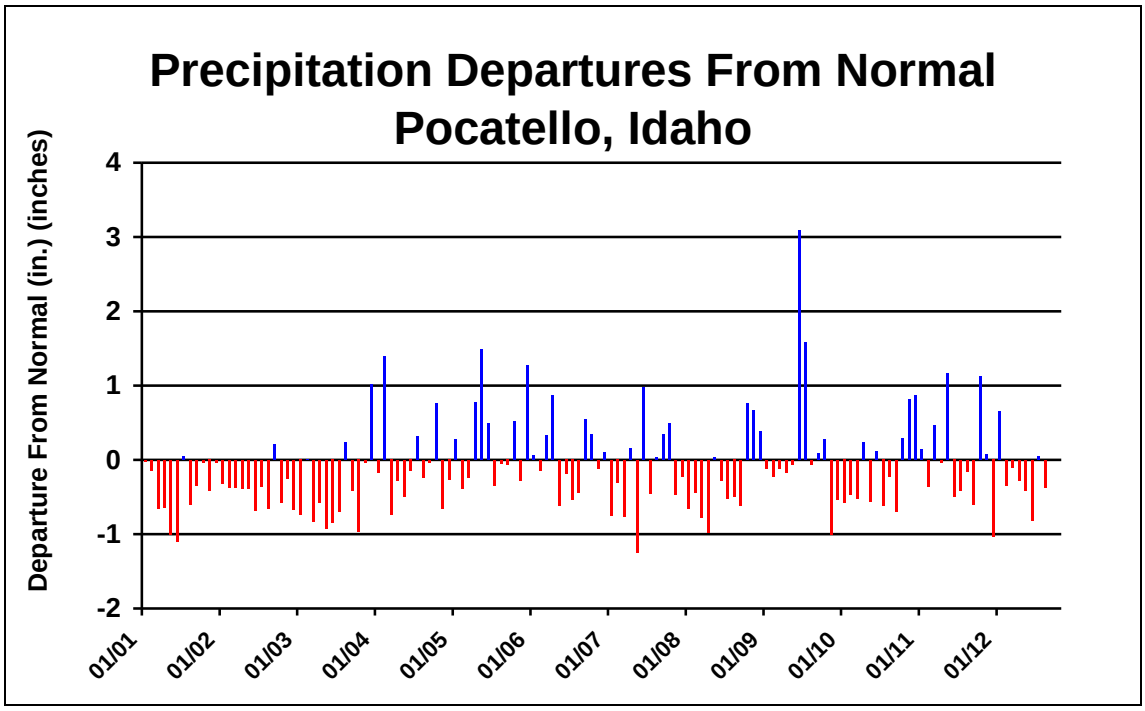

Figure 2.4 Precipitation departures from normal at Pocatello, Idaho based on thirty-year normals of data from 1971 to 2000 archived at the National Climatic Data Center.

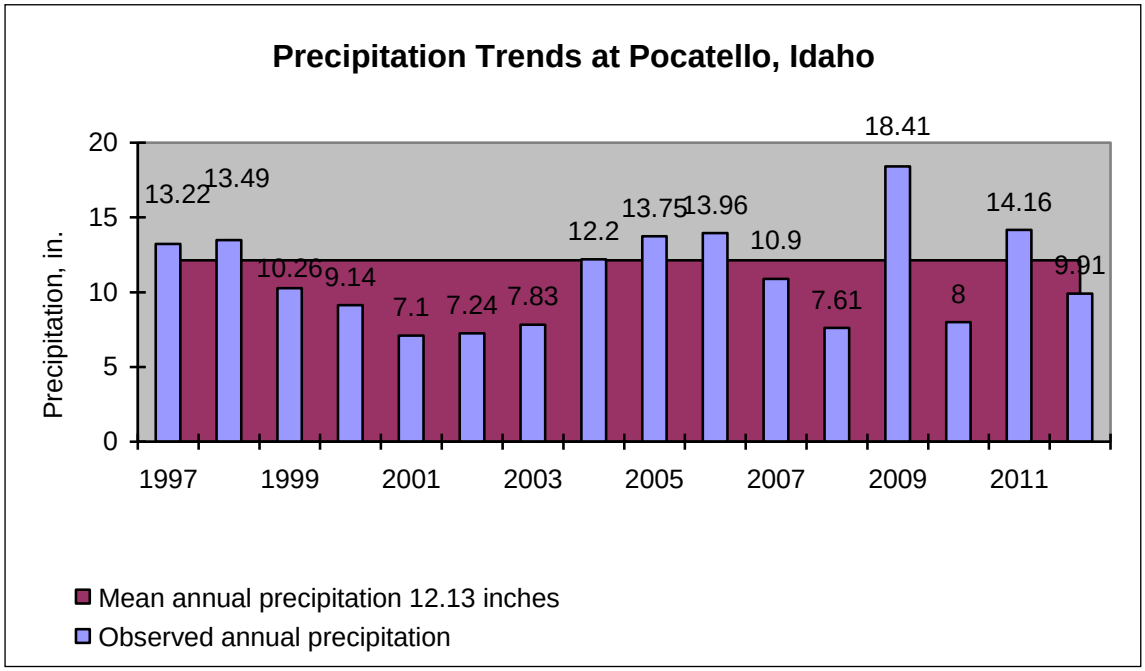

Figure 2.5 Water year (Oct. 1 to Sep. 30) observed precipitation at Pocatello, Idaho. Mean annual precipitation from National Climatic Data Center 1981-2010 monthly normals (previous 1971-2000 mean annual was 12.58 inches and for 1961-1990 12.14 inches).

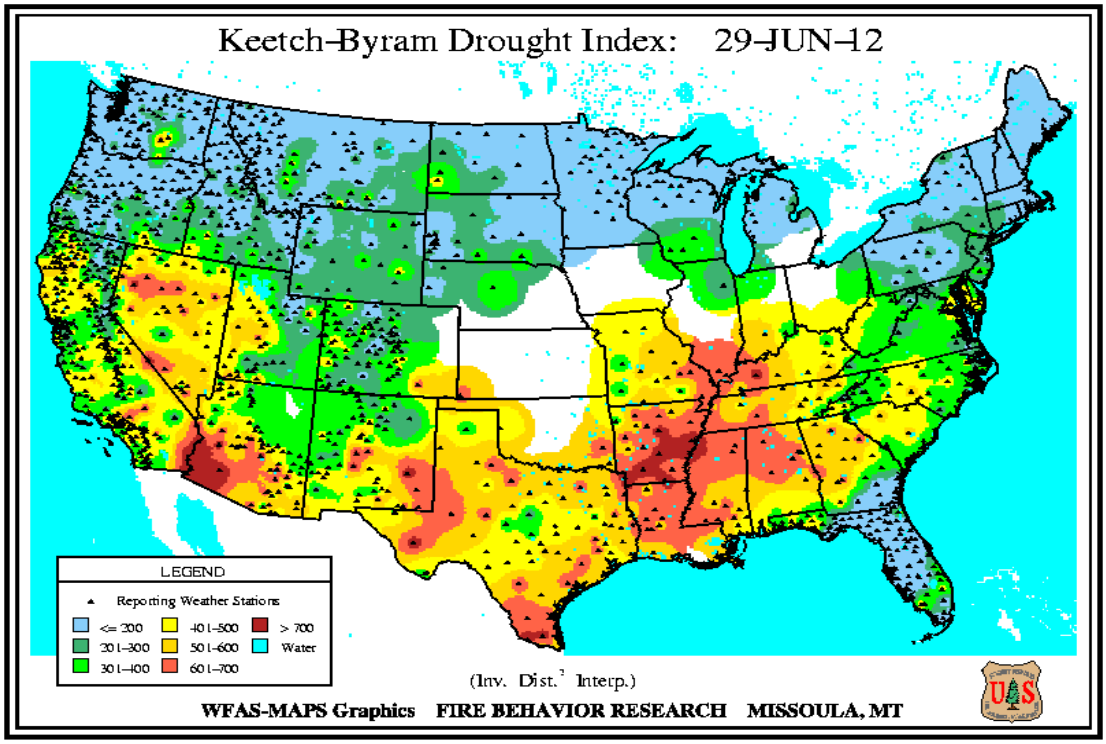

Figure 2.6(a) Keetch-Byram Drought Index reflecting more short term drought conditions, i.e. evapotransporation and near surface soil moisture. Valid June 30, 2012.

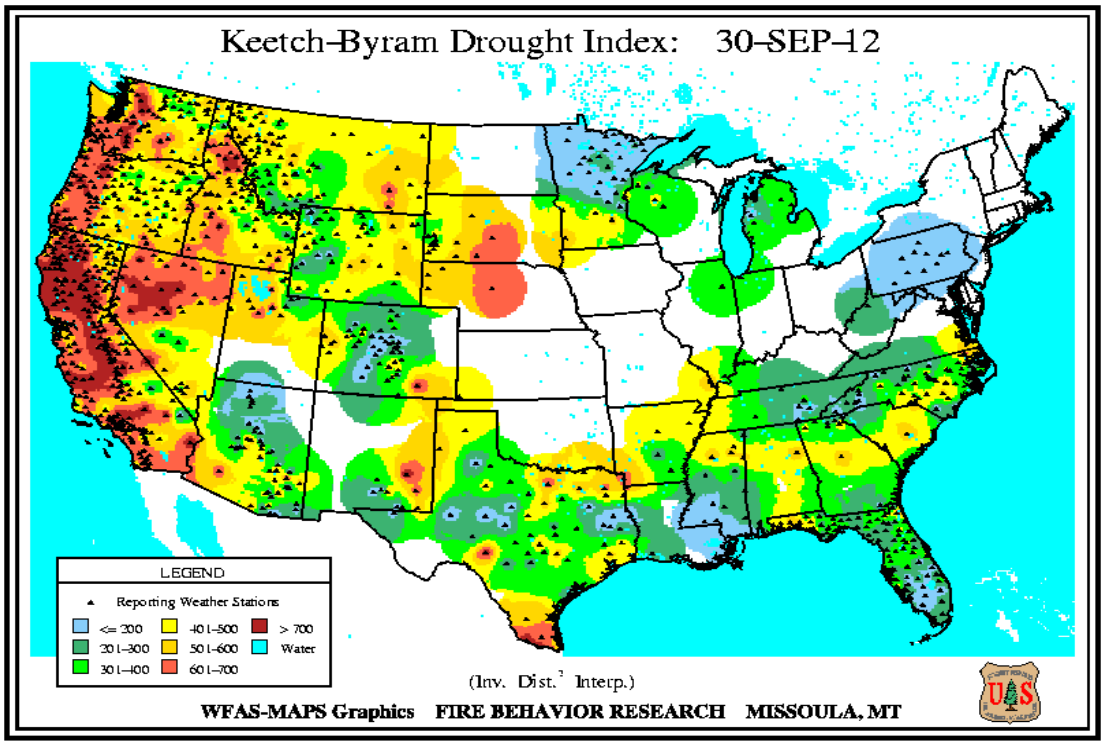

Figure 2.6(b) Keetch-Byram Drought Index reflecting more short term drought conditions, i.e. evapotransporation and near surface soil moisture. Valid September 30, 2012.

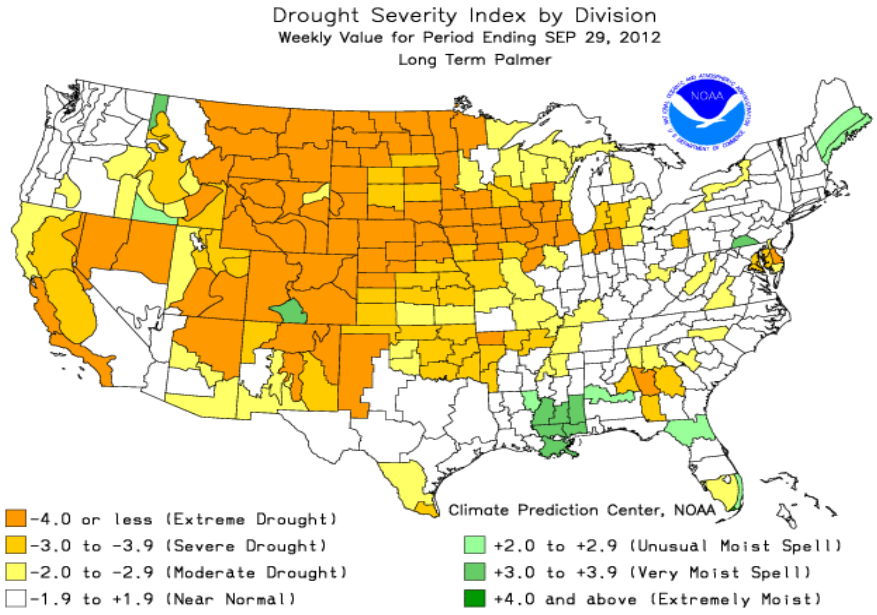

Figure 2.7 Palmer Drought Severity Index (September 2012) measuring long term meteorological conditions over many months.

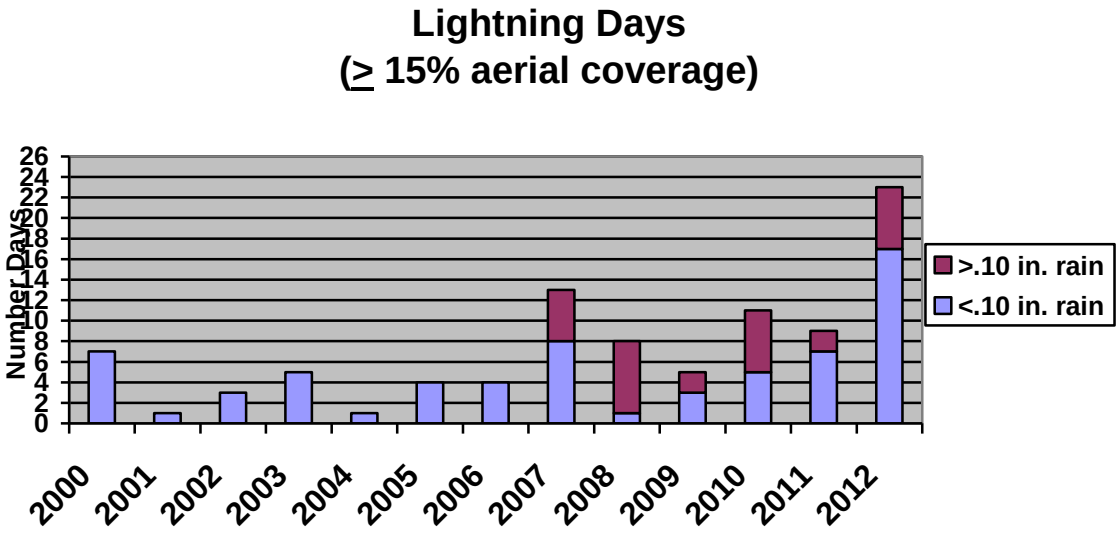

Figure 2.8 Number of days when thunderstorm and lightning activity in Southeast Idaho was judged to be significant as part of the Red Flag Event verification process. Prior to 2007 only days where thunderstorms were characterized as "dry" (<.10 inch rain) are indicated.

3. Weather in review: October 2011 – September 2012

October to November 2011. The first major storm system of the fall occurred between October 4th and 7th when a Pacific storm brought widespread rain and snow to southeast Idaho. Over the four day period from 1.5 to 2.5 inches of liquid water equivalent blanketed the area. Snow levels lowered to about 4700 feet on the 6th when up to 5 inches of snow was reported at Idaho Falls and seven inches at Soda Springs. Afternoon high temperatures following this event were about 15 degrees Fahrenheit cooler and relative humidity remained generally above 30 percent. This was an active weather month with additional storm systems off the Pacific on October 10-11th, 16-17th, and 22-23rd.

The pattern remained active through November, but with snow levels lowering to valley floors. A storm system on November 4-5th brought up to 5 inches of snow in the Chubbuck area and 6 inches at Ashton. On November 12-13th from 10 to 13 inches of snow fell around Preston and Montpelier. Yet another storm system on November 17-20th brought up to 11 inches of snow to the Sawtooth Mountains.

December 2011. A weak to moderate strength La Nina became established with a typical high pressure ridge located in the Gulf of Alaska. North to northwest winds into Idaho did not pick up moisture off the Pacific and left southeastern Idaho with a few light snow showers and otherwise generally dry and cold conditions through the entire month. Mountain snow packs lost much of the gains that had been made in October and November. The National Resource Conservation Service snow monitoring stations (SNOTEL) in many locations showed near record low snow pack by the end of the month.

January to February 2012. A weak to moderate strength La Nina was maintained through the month of January, then began to dissipate through February. By the second week of January the storm track had transitioned to a westerly flow off the Pacific Ocean. This became a very moist pattern with minor embedded disturbances and strongly favored the western slopes of the central mountains and the eastern highlands, especially north of Victor. From January 18th through the end of the month, some really impressive snow accumulations of 2 to 4 feet occurred in the higher elevations between Stanley and Ketchum. The effects were less pronounced between Victor and Island Park however, 11 inches of snow was reported at Island Park on January 18th. Up to 45 inches of snow was reported in the mountains southwest of Burley on the 19th. Westerly winds also helped moderate temperatures. The National Weather Service Office in Pocatello reported mean monthly temperatures for January and February of 4.8F and 2.9F above normal, respectively. In late February, warm rain falling on snow pack caused high flows on the Middle Fork of the Salmon. As impressive as these snow amounts are, snow packs in many areas including the Little Wood, Big Lost and Little Lost Basins were only 60-75 percent of average.

March 2012. Above normal temperatures and rising snow levels were the main story in March, especially by the third week of the month. At elevations up to 8000 feet snow was melting as much as two weeks early. La Nina dissipated and a low pressure trough

developed in the northeastern Pacific with several disturbances ejecting northeastward through Idaho. Southerly flow ahead of each disturbance would raise snow levels. The central mountains around Stanley continued to fair well with mountain snow. Stanley reported record precipitation of 0.85 inch on the 16th and 0.97 inch on the 30th. The SNOTEL reporting sites show the storm system of March 14-16th brought up to a foot of snow to the mountains around Ketchum, Mackay, and Stanley. In Island Park, 10 inches of snow was reported on March 17th, and 3 inches of snow fell at Idaho Falls on the 19th. Meanwhile, Record warm temperatures were reported at Pocatello; 70F on the 24th and 73F on the 31st.

April to May 2012. Highly amplified low pressure systems crossed southeast Idaho on 5-6th, 12-13th, 17-20th, and 26-27th of April. Record high temperatures were observed at Pocatello on the 10th (78F), 11th (76F), 22nd (85F), and 23rd (86F). Precipitation across the area was below normal; records show at Stanley and Pocatello, precipitation was 0.76 and 2.40 inches below normal, respectively. Mountain snow packs continued to melt at an accelerated rate with rain falling at or above 7000 feet of elevation. As we marched through May, storms were less frequent and temperatures continued above normal. Pocatello Airport reported a record high of 88F on the 15th; and 92F on the 21st. The most significant storm system of the month occurred May 24-27th when a low pressure system brought some impressive two-day rain totals. Storm total rain fall of 1.45 inches was reported in Idaho Falls; 0.78 inch at Hailey; 0.67 inch at Rexburg; and 1.17 inches at the Pocatello Airport. However, precipitation at the Pocatello Airport was still 0.41 inch below normal for the month.

June 2012. Low pressure disturbances developed in the northeastern Pacific and tracked through Oregon to the Idaho pan handle on June 5-6th, 8-9th, and 26-27th. With each of these disturbances precipitation was largely limited to the Stanley area and northern Idaho. A summertime high pressure ridge began to develop around Oklahoma and Texas helping to keep southerly warm dry air over the Great Basin. Fuels in the Snake Plain and south central and eastern highlands became critical for fire concerns quickly this year and gusty winds associated with passing Pacific cold fronts resulted in Red Flag Warnings being issued on the 17-18th, 24-26th, and 28th.

- Charlotte Fire, 6/28/12
  - 5 miles south of Pocatello
  - 1,038 acres
  - Homes Lost 66, other structures 29

July to early September 2012. The most significant rain event of the summer occurred July 13-16th, when a strong surge of northward moving moisture associated with the Southwest Area Monsoon winds was focused between a low pressure trough over Oregon and a sharp ridge of high pressure over New Mexico and Colorado. During the four day event, the Pocatello Airport measured 0.66 inch of rain; Idaho Falls 0.61 inch; Stanley 0.40 inch; and Burley 0.29 inch. Otherwise, July through the first week of September proved to be one of the most critical fire weather seasons since the National Weather

Service Office in Pocatello assumed forecast responsibility for southeastern Idaho in the year 2000. Low pressure disturbances off the Pacific would cross northern Idaho roughly every 5 days (9 different events) and bring strong gusty winds and low relative humidity with little or no rain to southeast Idaho. Thunderstorm activity associated with the monsoon was significant enough for Red Flag Warnings to be issued on 19 different days during July and August. Very few of these storms produce wetting rains ($\geq$ 0.10 inch). Strong gusty winds were also a factor in fire weather conditions September 2-5th, 9-10th, and 14-15th.

- Halstead Fire, 7/27/12
  - 18 miles NW of Stanley
  - 181,798 acres
- Mustang Fire, 7/30/12
  - near North Fork
  - 340,659 acres
- Minidoka Complex, 8/5/12
  - Cassia and Black Pine Divisions of the Sawtooth National Forest
  - 88,909 acres

Late September and October. September 23-25th a low pressure circulation moved from Oregon to Northern Utah. Stanley Ranger Station reported 0.10 inch rain on the 23rd and 0.25 inches on the 25th. Heavy rain was not widespread with this event; the Pocatello Regional Airport only reported 0.02 inch of rain on the 24th. Additional fall storm systems did not occur until October 16th when Stanley reported 0.62 inch rain, and some snow was observed at high elevations. A substantial low pressure system brought widespread snow to the mountains and mixed rain and snow to the lower valleys October 23-25th.

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4. Precipitation and Dry 1000 hour fuels by zone:

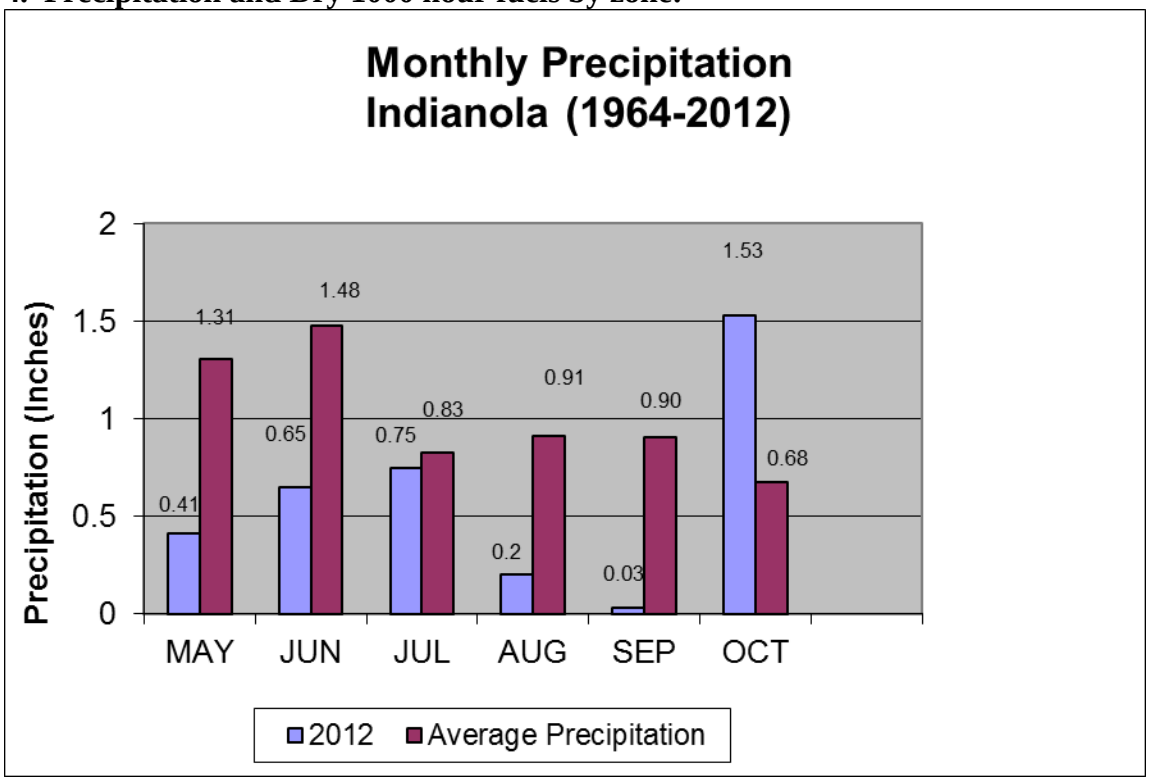

Figure 4.1(a) Observed and average precipitation at Indianola RAWS site, Fire Weather Zone 475.

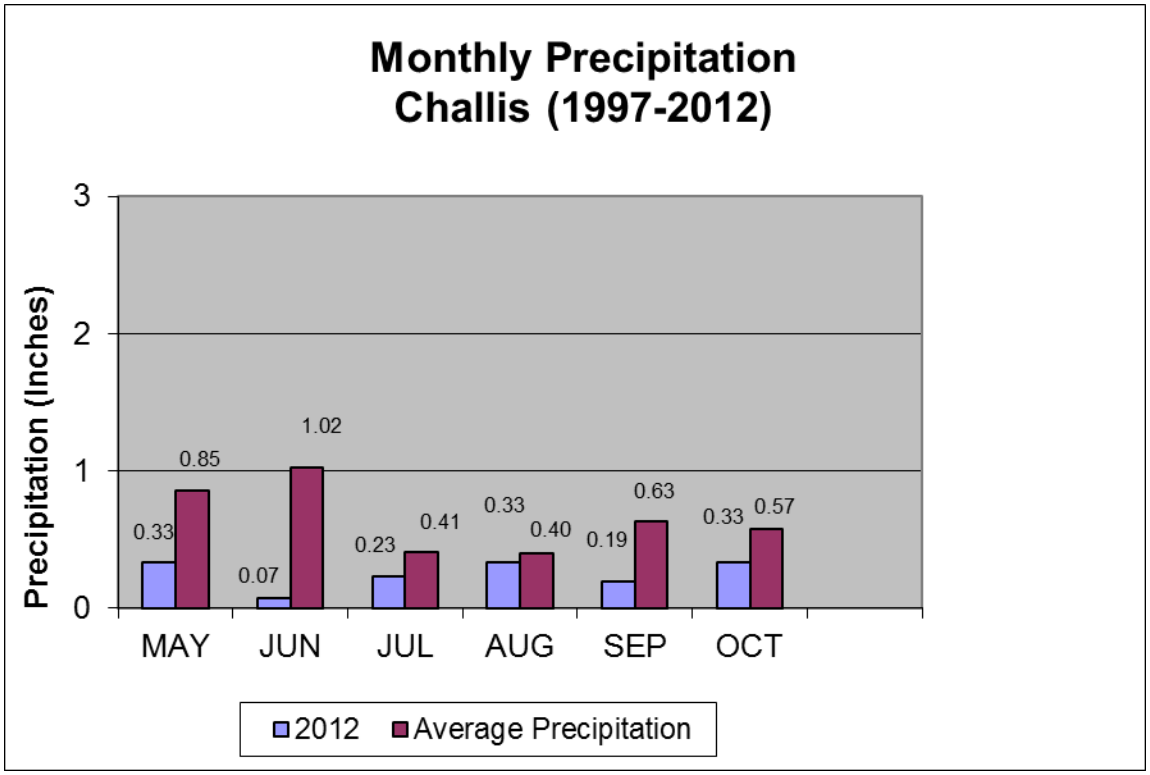

Figure 4.1(b) Observed and average precipitation at Challis RAWS site, Fire Weather Zone 476.

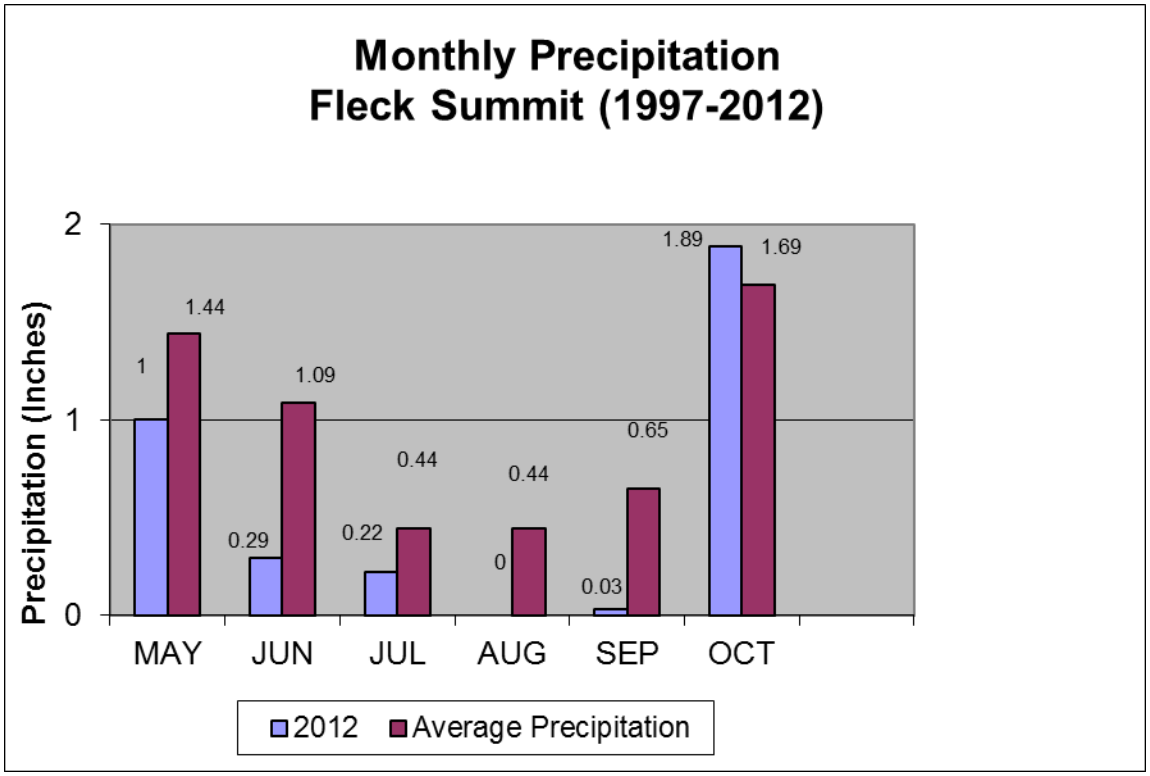

Figure 4.1(c) Observed and average precipitation at Fleck Summit RAWS site, Fire Weather Zone 477.

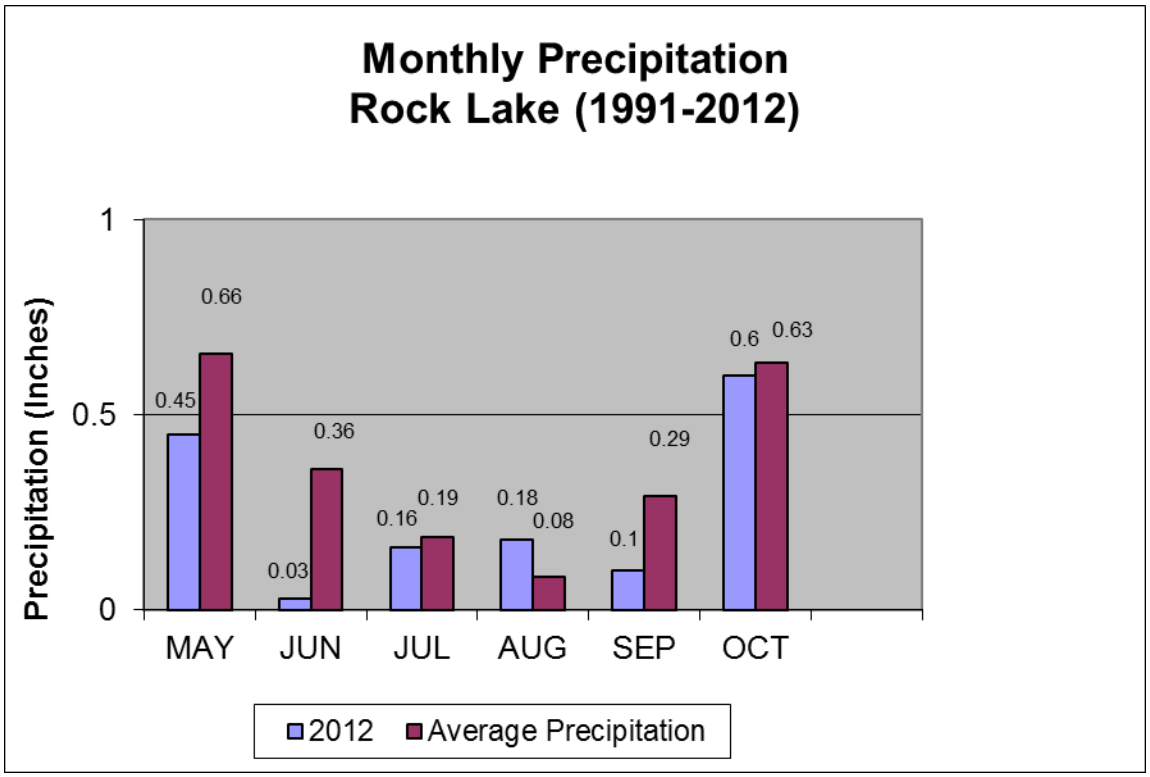

Figure 4.1(d) Observed and average precipitation at Rock Lake RAWS site, Fire Weather Zone 409.

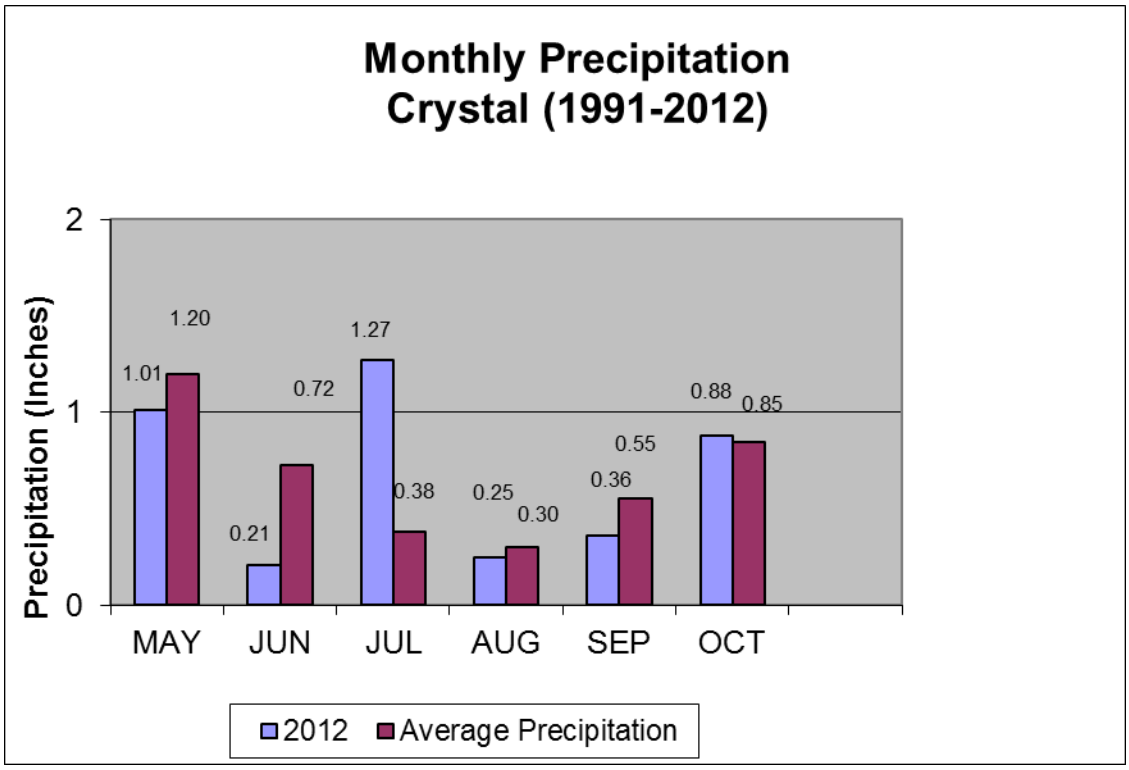

Figure 4.1(e) Observed and average precipitation at Crystal RAWS site, Fire Weather Zone 410.

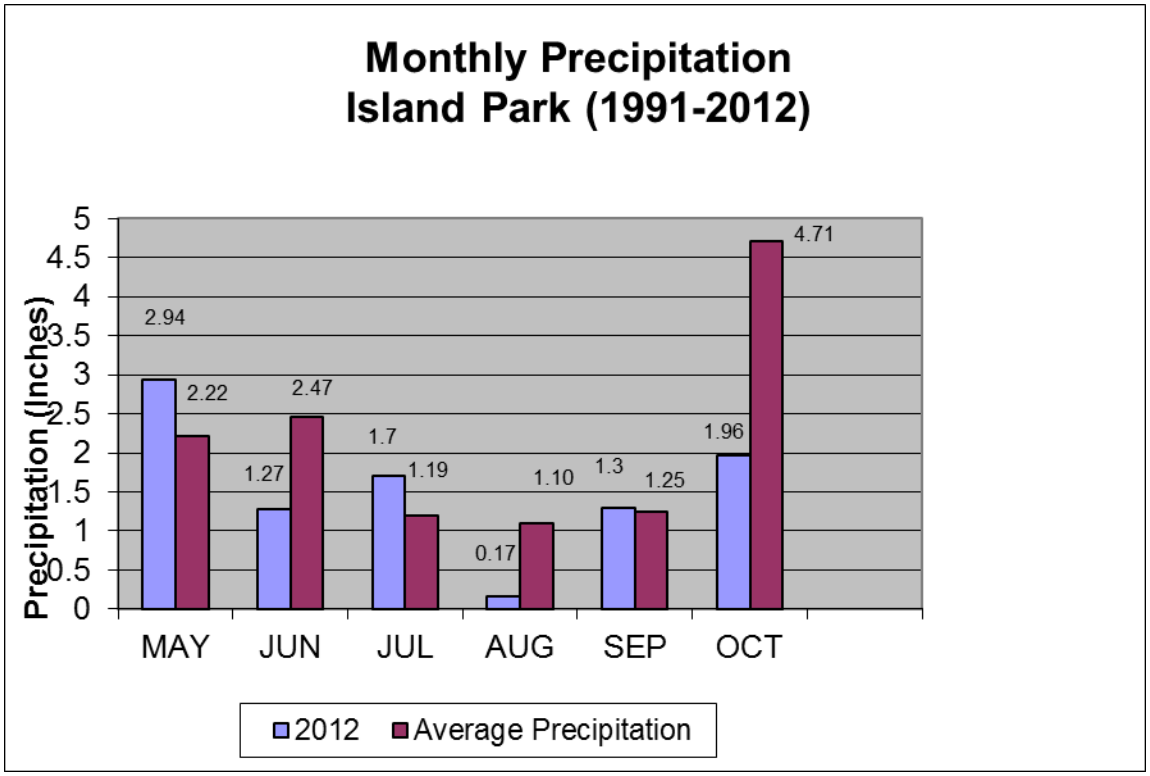

Figure 4.1(f) Observed and average precipitation at Island Park RAWS site, Fire Weather Zone 411.

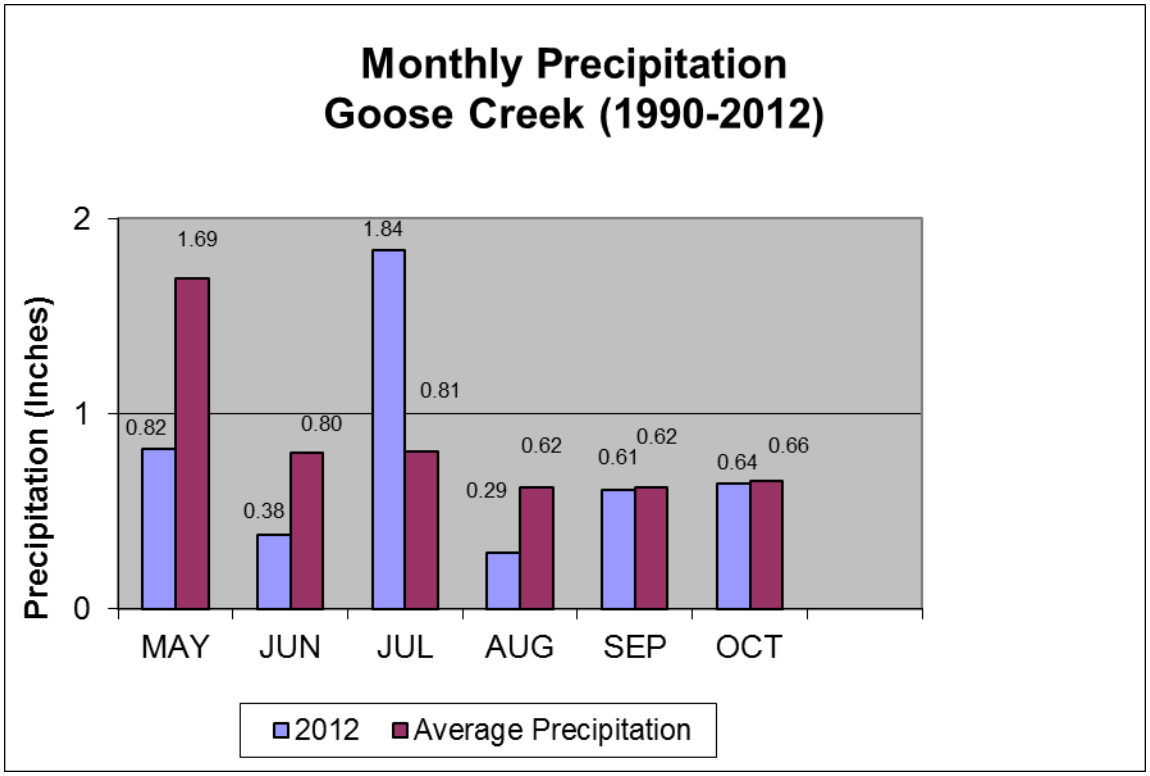

Figure 4.1(g) Observed and average precipitation at Goose Creek RAWS site, Fire Weather Zone 412.

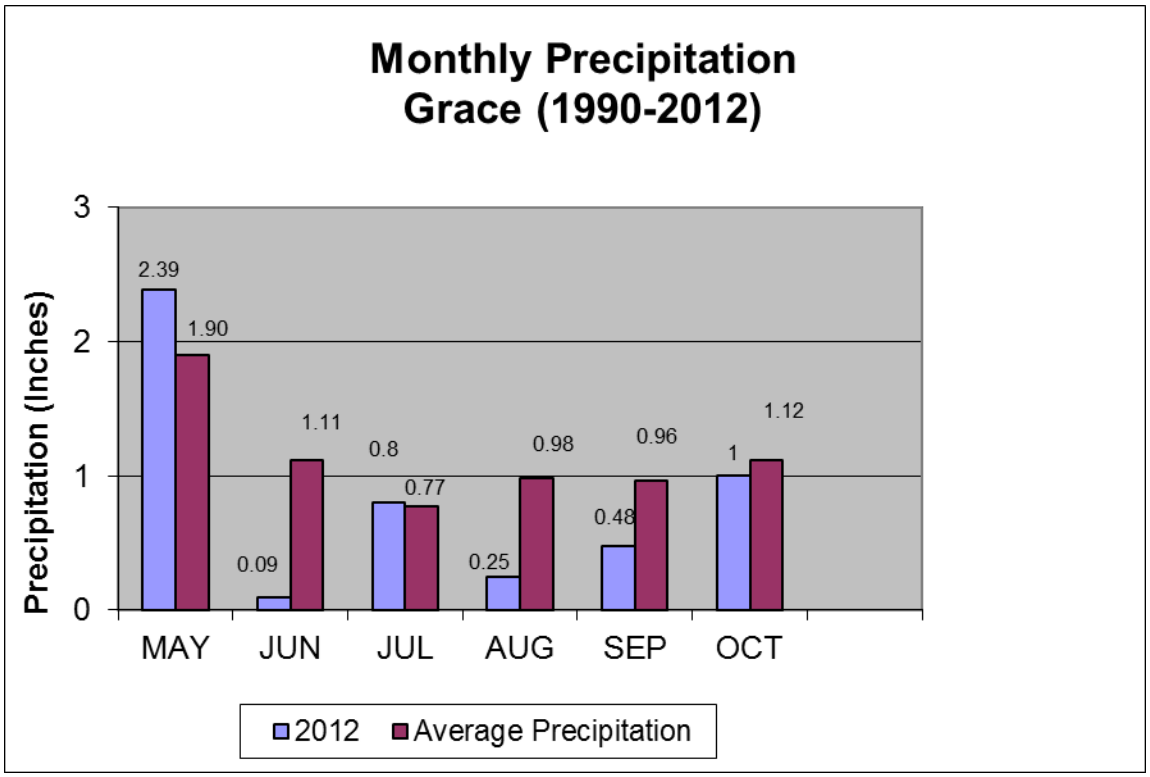

Figure 4.1(h) Observed and average precipitation at Grace RAWS site, Fire Weather Zone 413.

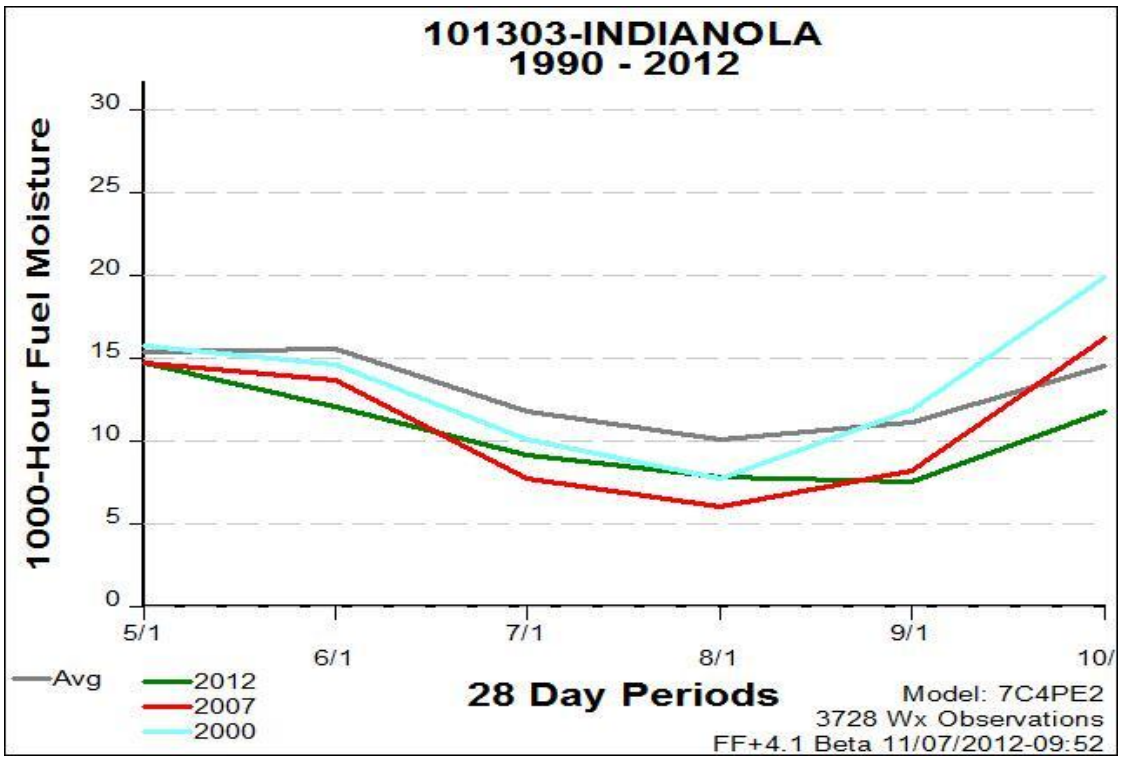

Figure 4.2(a) Observed and average 1000 Hour Fuel Moisture at Indianola RAWS site, Fire Weather Zone 475.

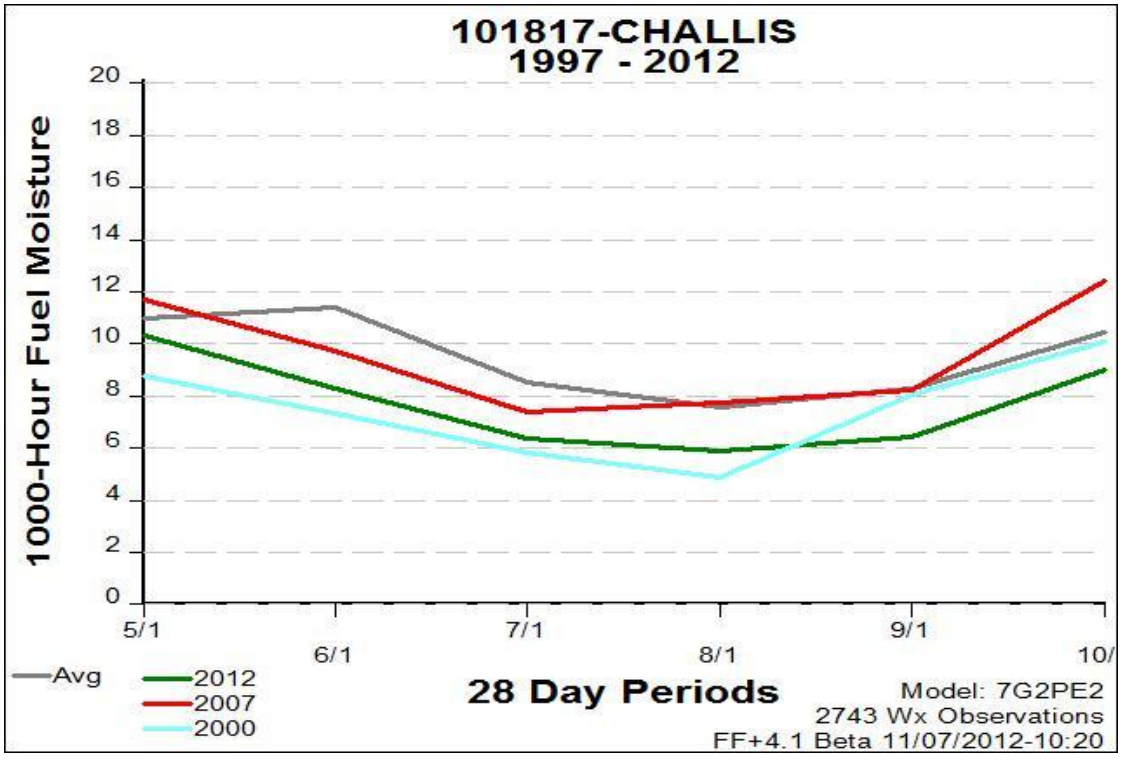

Figure 4.2(b) Observed and average 1000 Fuel Moisture at Challis RAWS site, Fire Weather Zone 476.

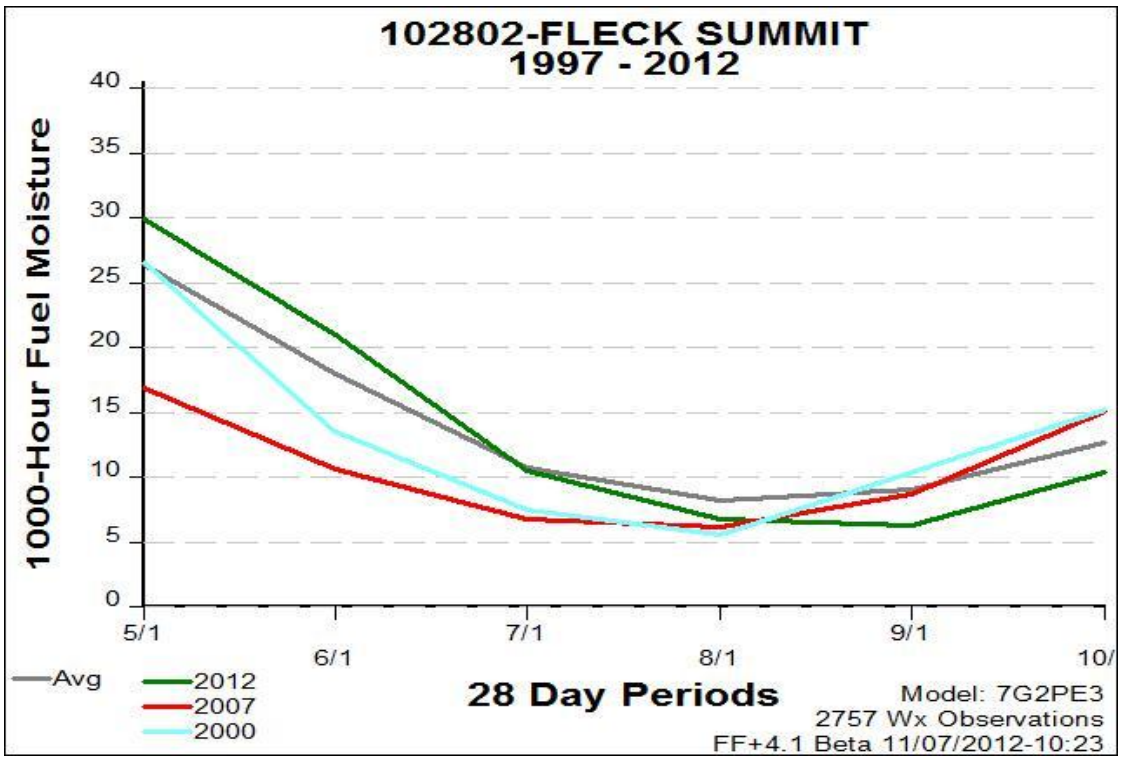

Figure 4.2(c) Observed and average 1000 Fuel Moisture at Fleck Summit RAWS site, Fire Weather Zone 477.

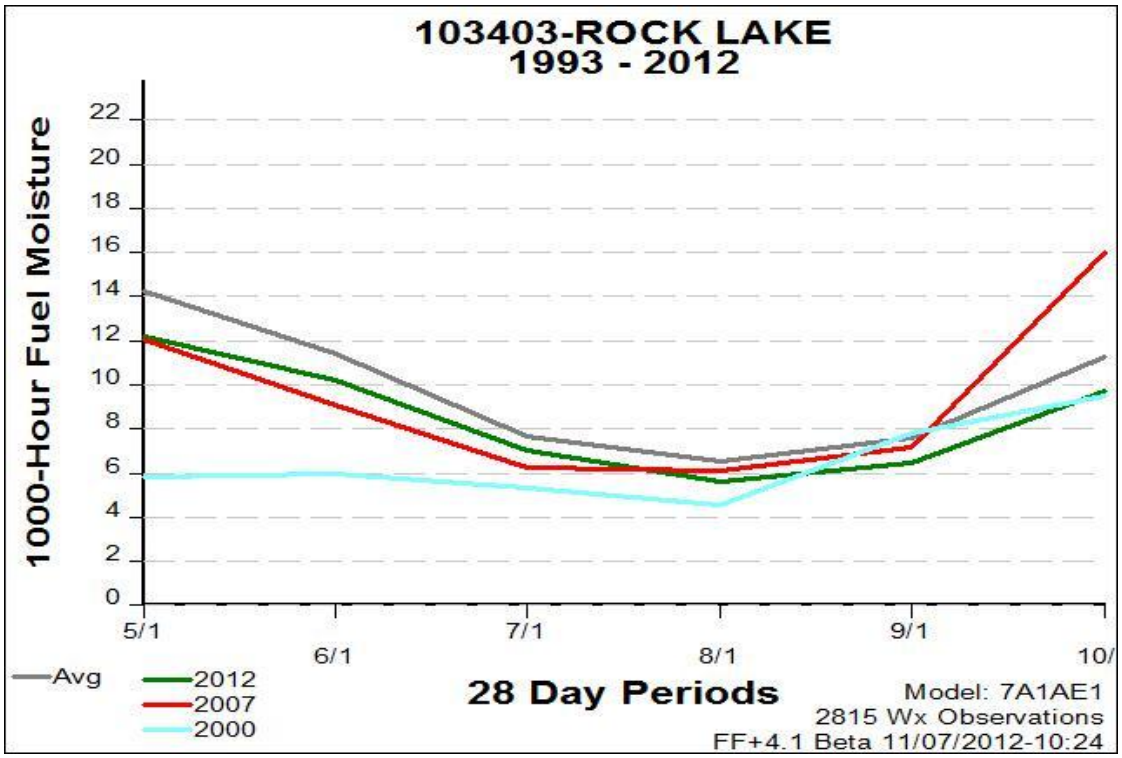

Figure 4.2(d) Observed and average 1000 Hour Fuel Moisture at Rock Lake RAWS site, Fire Weather Zone 409.

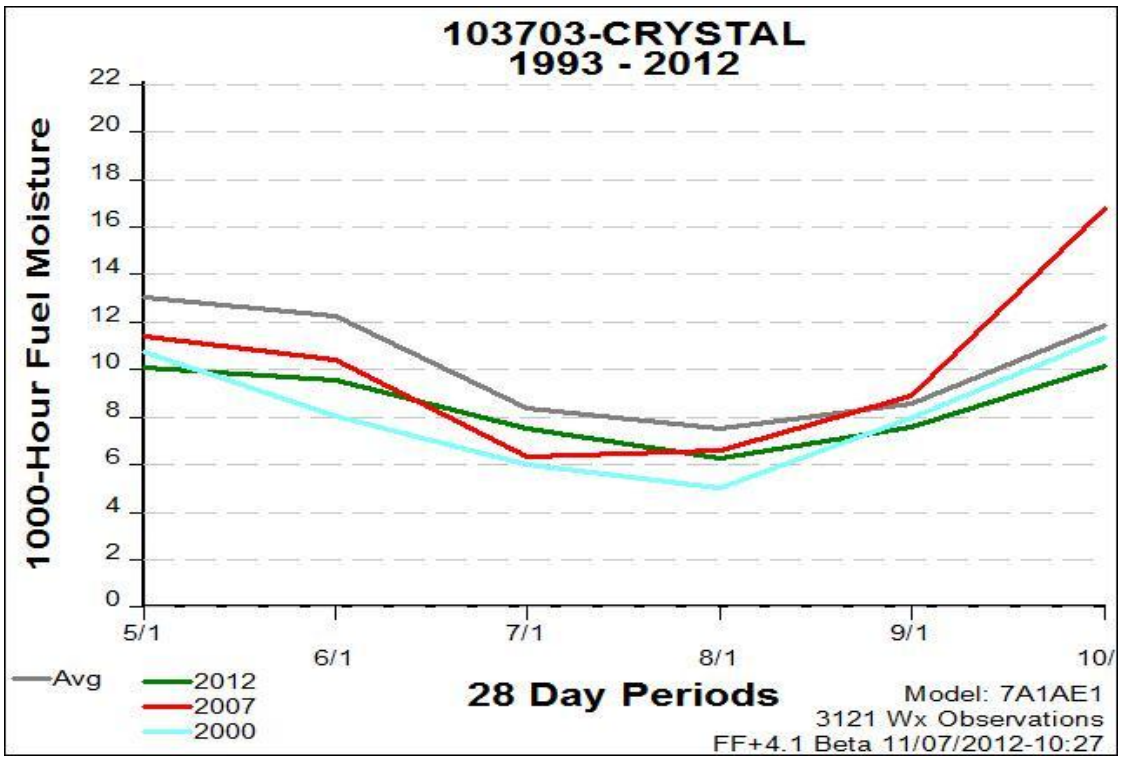

Figure 4.2(e) Observed and average 1000 Hour Fuel Moisture at Crystal RAWS site, Fire Weather Zone 410.

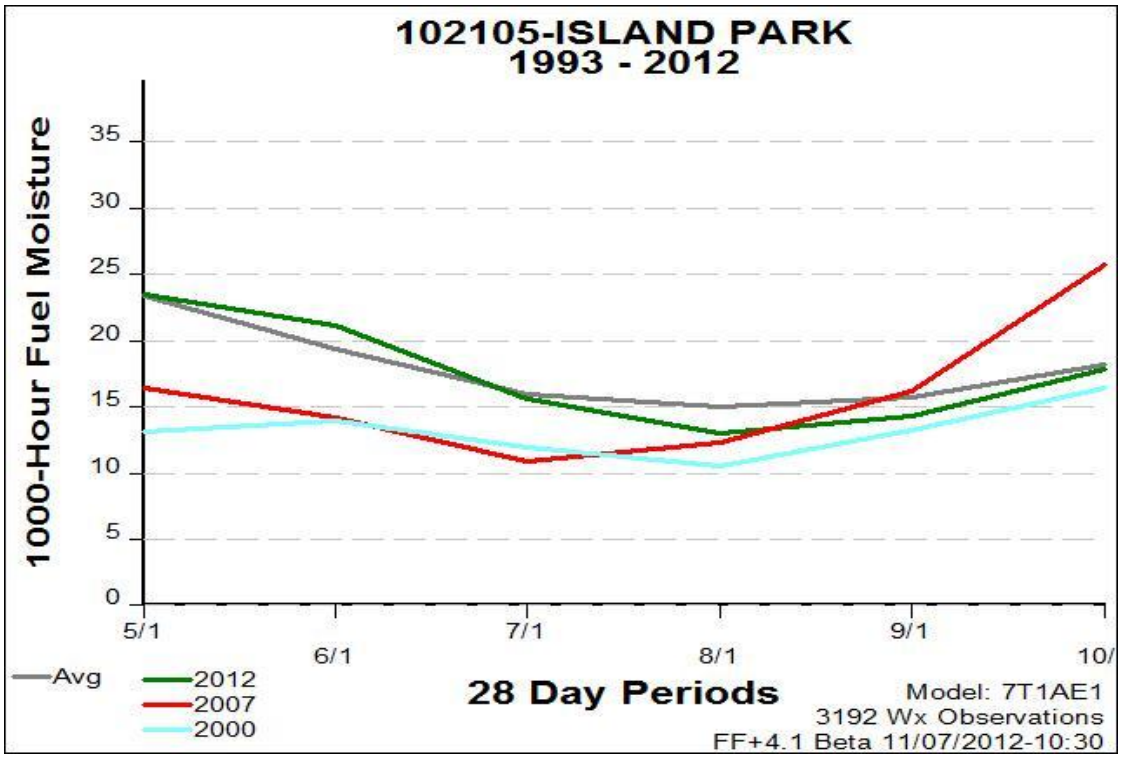

Figure 4.2(f) Observed and average 1000 Hour Fuel Moisture at Island Park RAWS site, Fire Weather Zone 411.

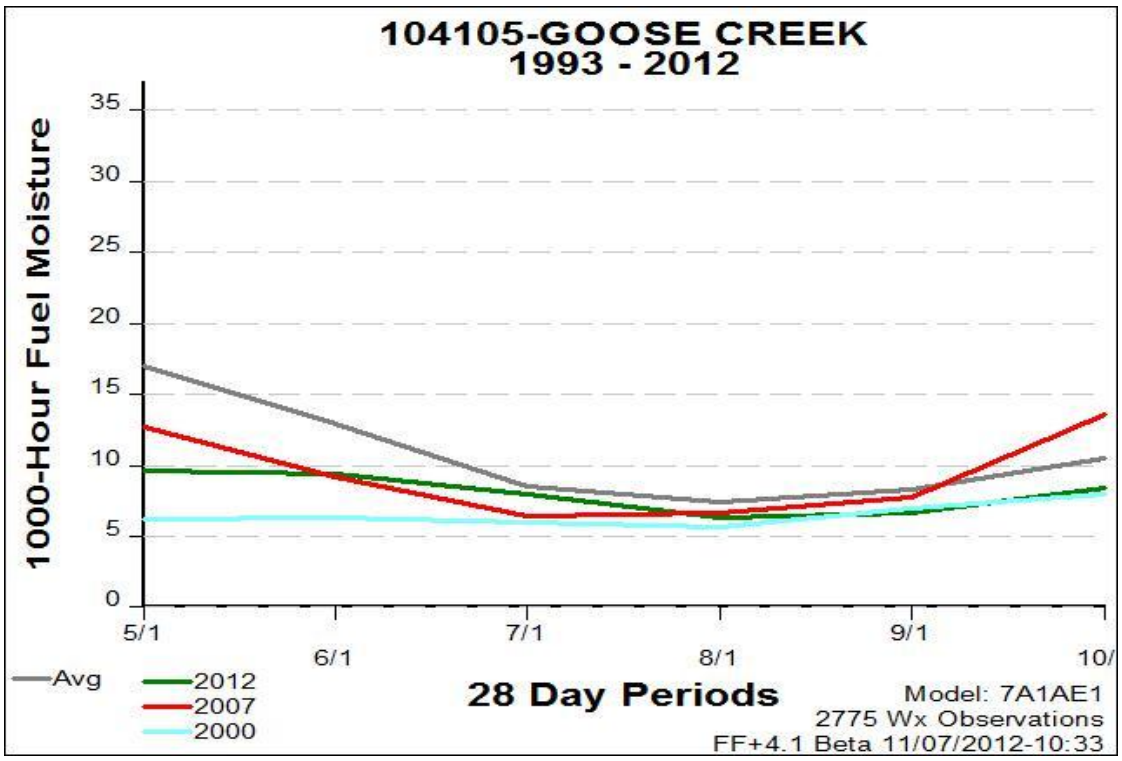

Figure 4.2(g) Observed and average 1000 Hour Fuel Moisture at Goose Creek RAWS site, Fire Weather Zone 412.

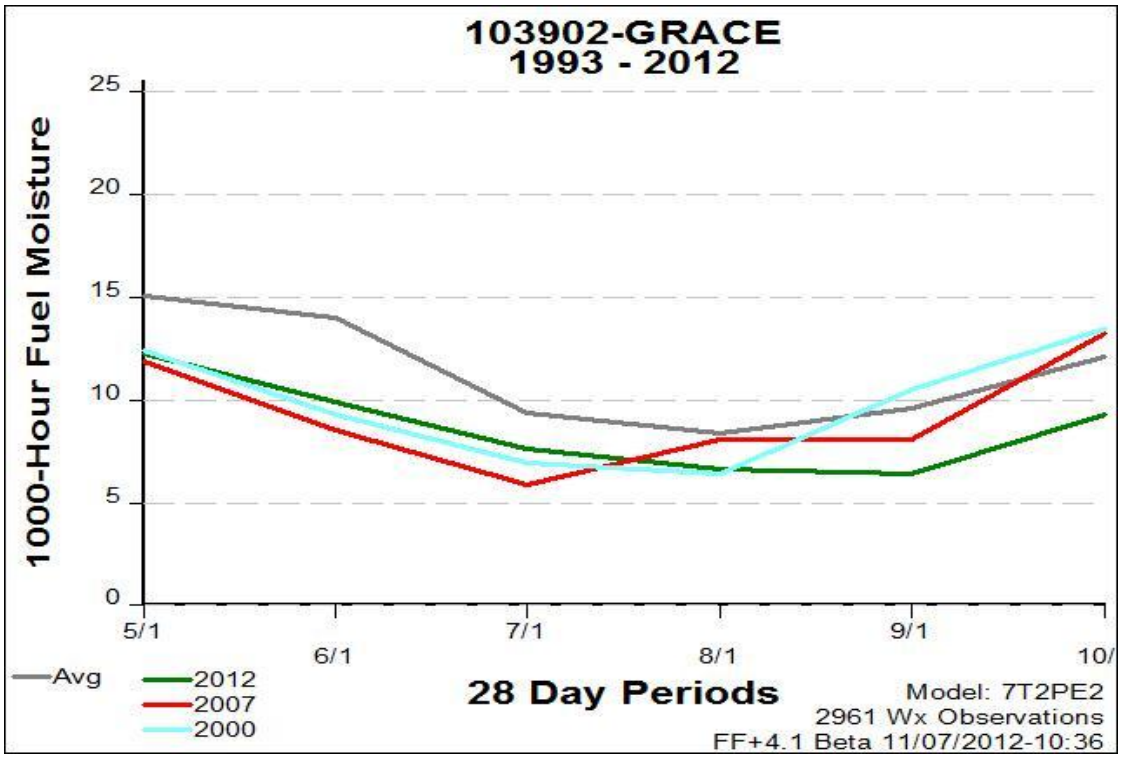

Figure 4.2(h) Observed and average 1000 Hour Fuel Moisture at Grace RAWS site, Fire Weather Zone 413.

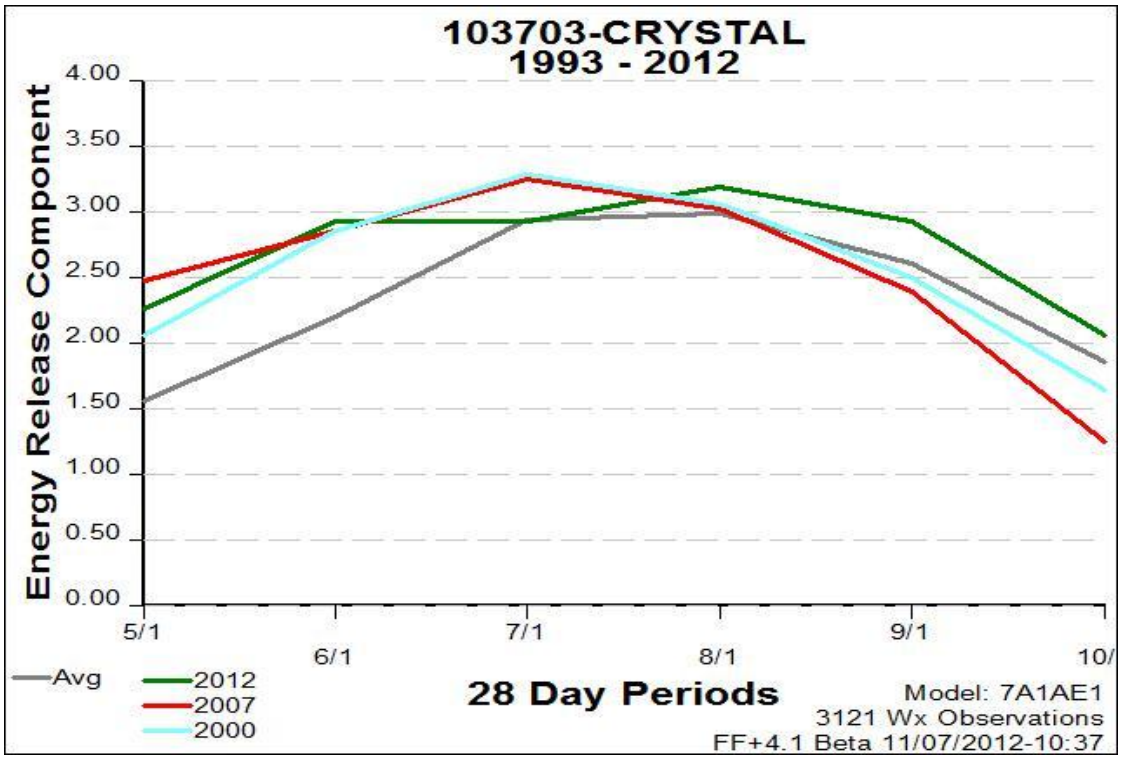

Figure 4.3 Calculated Energy Release Component at Crystal RAWS site, Fire Weather Zone 410.

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5. Office Operations:

5.1 Red Flag Verification

1. Formal verification of Red Flag Warnings in Southeast Idaho began with the 2000 fire season and is now a permanent part of the fire weather program. Verification is based on current Red Flag Warning and Fire Weather Watch criteria that has been coordinated with local land management agencies and published in the Great Basin Annual Operating Plan for Fire Weather and Predictive Services. Current criteria for the Pocatello Fire Weather District are shown in paragraph 5.1.2 below.

Events considered "short fused" or having time lengths typically less than six to twelve hours (Dry Lightning) were split out from other events occurring over a longer time period, reference tables 5.1 (a-d) below.

2. Conditions that indicate a Red Flag Event:

Fire Weather Watches and Red Flag Warnings, are issued for conditions of very high or extreme fire danger (as determined by land management agencies) and dry fuels, in combination with one of the following:

a. Widely scattered or greater ($\geq$ 15% of aerial coverage) thunderstorm activity.

b. Winds gusts for any three or more hours $\geq$ 25 mph for Southeast Idaho Mountains, $\geq$ 30 mph for the Snake River Plain and relative humidity is $\leq$ 15 percent.

c. In the judgment of the forecaster, weather conditions will create a critical fire control situation. These conditions may include strong microburst winds, passage of a cold front or a strong wind shift.

Red Flag criteria are developed from a local knowledge of fuel types, terrain, weather conditions that are common or unusual to the area, historical fire behavior, and judgment of the local land management agencies. Because the criteria for issuing Red Flag products can vary from one district to another, these verification results are not necessarily comparable with other forecast offices.

3. Methodology:

Verification of Red Flag Warnings was conducted on a zone by zone basis. Example: If a warning for strong wind was issued for fire weather zones 409 and 410, but strong winds were observed only in zone 410, then this counts as two warnings, one that verified and one false alarm. Also, if strong winds were observed in zone 412, but no warning was issued, then this would be counted as one missed event.

Sources of verification included Remote Automated Weather Stations (RAWS), Meteorological Reporting Stations (METAR), lightning data; WSR-88D Doppler Weather Radar estimated precipitation, volunteer weather spotter information such as heavy rain events, and reports of observed fire behavior from personnel in the field.

Local MESONET reporting networks maintained by Idaho Department of Transportation and the Idaho National Laboratory were not used as a source of verification for wind events since there are differences in observing standards at these sites.

Statistical parameters were calculated as follows:

Probability of Detection	POD = a/(a+c)
Critical Success Index	CSI = a/(a+b+c)
False Alarm Rate	FAR = 1-[a/(a+b)]

where

a = the number of correct warnings (verified)
b = the number of incorrect warnings (not verified)
c = the number of events not warned

4. Sources of error:

Red Flag criteria for wind events in the Great Basin were modified based on interagency agreement set forth in the Great Basin Fire Weather Operating Plan for 2005 and continued without change for the 2006 and 2007 fire seasons. Beginning with the 2008 fire season, the distinction between wet and dry thunderstorms was eliminated from the Red Flag criteria owing to concerns of lightning strikes and fire ignition occurring outside the main thunderstorm rain shaft. A thunderstorm was previously considered "dry" if it produced little or no precipitation (< 0.10 inch). The mid-point of a forecast range serves as the break point for watch/warning issuance. This effectively adds an element of representativeness to the verification process. Therefore, any inference of trends from verification results must consider changes made to the established criteria for a Red Flag Event and verification procedures in past years. The Red Flag Event criteria and verification procedures also changed in 2002 and 2004. Please reference past issues of this Fire Weather Annual Report.

Forecaster skill level and confidence may be lower for peak wind gusts over sustained wind speed. Downward transport of momentum in the atmosphere, complex terrain, inversions of temperature lapse rate, variations in surface insolation owing to vegetative ground cover, reflectivity, absorption and transmissivity of the atmosphere, and the energy phase change of water in the atmosphere all impact the observed peak surface wind gust. Not all of these processes are sufficiently represented by available computer modeling and operational forecaster techniques.

Personal judgment was required to determine when lightning was more than an isolated event and significant in areal coverage.

Field observations of fire behavior may serve as an important indicator of Red Flag conditions. On rare occasion this may affect the best judgment of the forecaster and land management personnel. On days or in locations where there were no on-going fires this information was not available.

In paragraph 2c above, judgment of the forecaster and land management personnel is permitted to override the strict criteria of relative humidity and wind gusts. The general consensus is there is enough uncertainty in the fire environment (fuel, weather and topography) and this should remain a necessary and important element of the Red Flag criteria. This also requires a certain amount of judgment in the verification process.

Both RAWS and METAR stations report instantaneous wind gusts, but the observing standards for height of the wind sensor can vary.

On rare occasion the fuels were defined as critical at an elevation below that of existing RAWS and METAR stations.

Skill and lead-time vary with the type of event.

5. Decision Criteria

Wind – The number of available RAWS and METAR sites varied both with the area warned and location where fuels were defined as critical. Every attempt was made to judge the representativeness of wind conditions.

Lightning – Archived lightning data was used to determine verification. A good deal of judgment was needed to determine if the observed lightning was more than an isolated event. Some thunderstorms are more efficient lightning producers than others.

Wet versus dry thunderstorms – this element was removed from the Red Flag Criteria beginning with the 2008 fire season. The number of reported fire starts is not a reliable indicator since lightning strikes can occur outside the thunderstorm precipitation shield striking drier fuels and a single thunderstorm can be long lived producing numerous strikes over some distance.

Other – Reports of observed fire behavior from personnel in the field continue to be useful when dealing with long-term drought conditions and days of reported low relative humidity. If sustained fire runs are observed but available observations do not necessarily support warning criteria, the judgment would likely fall on the side of safety of life and property.

6. Results:

Red Flag Warning criteria were met on a total of 43 different days during this fire season in the Pocatello Fire Weather District. Strong gusty winds and low relative humidity were a factor on 24 of these days; thunderstorms and lightning activity were a significant factor on 23 of these days. There were 15 events (zones) when Red Flag Warning criteria were met without a warning in effect.

	May	June	July	August	September	October	Total
Total # watches	0	5	22	49	11	0	87
Total # of warnings	0	11	59	65	35	4	174
Number warnings that were preceded by a watch	0	2	20	43	10	0	75
Warnings verified (a)	0	8	40	55	24	3	130
Warnings not verified (b)	0	3	19	10	11	1	44
Events not warned (c)	0	1	3	2	6	3	15

Table 5.1(a). Combined synoptic (long term) and short fused Red Flag event products issued in the WFO Pocatello Fire Weather District during the 2012 season.

	May	June	July	August	September	October	Total
Total # watches	0	5	5	26	9	0	45
Total # of warnings	0	11	8	29	29	4	81
Number warnings preceded by a watch	0	2	5	23	9	0	39
Warnings verified (a)	0	8	5	24	18	3	58
Warnings not verified (b)	0	3	3	5	11	1	23
Events not warned (c)	0	1	2	1	5	3	12

Table 5.1(b). Synoptic scale Red Flag event products issued in the WFO Pocatello Fire Weather District during the 2012 season. Example cold fronts, low relative humidity, strong pressure gradient related winds.

	May	June	July	August	September	October	Total
Total # of watches	0	0	17	23	2	0	42
Total # of warnings	0	0	51	36	6	0	93
Number warnings preceded by a watch	0	0	15	20	1	0	36
Warnings verified (a)	0	0	35	31	6	0	72
Warnings not verified (b)	0	0	16	5	0	0	21
Events not warned (c)	0	0	1	1	1	0	3

Table 5.1(c). Short fused Red Flag event products issued in the WFO Pocatello Fire Weather District during the 2012 season. Example: lightning events and strong micro burst winds.

Red Flag verification resulted in the following:

	Synoptic Events	Short Fused Events (Lightning)	All Events
Probability of detection POD =	0.83	0.96	0.90
Critical success index CSI =	0.62	0.75	0.69
False alarm rate FAR =	0.28	0.23	0.25
Average lead time for Watches =			34 hrs. 25 min
Average lead time for Warnings =	12 hrs. 29 min.	12 hrs. 05 min.	12 hrs. 17 min

Table 5.1(d). Combined synoptic (long term) and short fused Red Flag event products issued in the WFO Pocatello Fire Weather District during the 2012 season.

7. Implications:

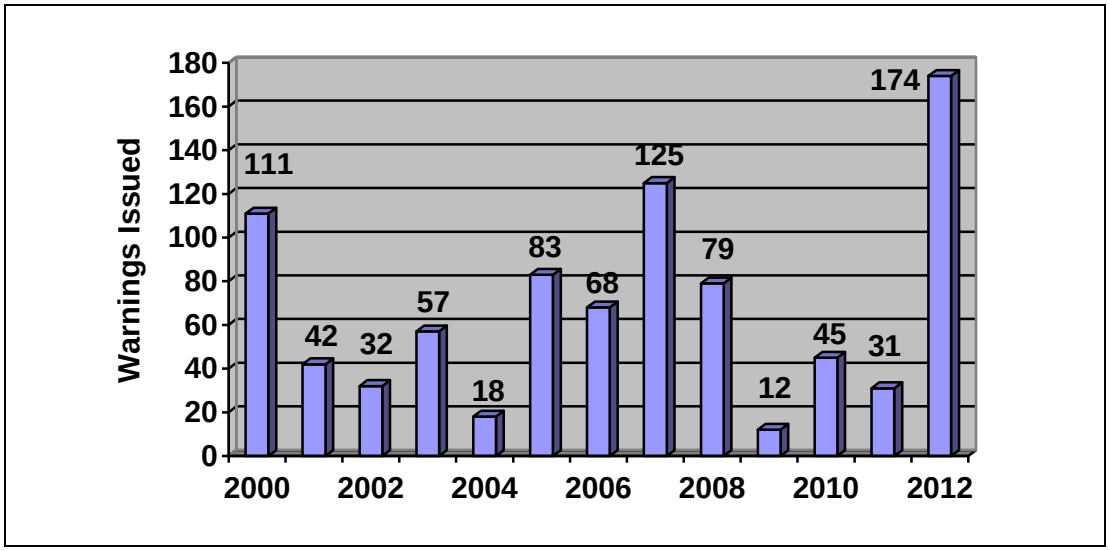

Figure 5.2 Historical Red Flag Warnings in Southeast Idaho; based on one warning per fire weather zone meeting criteria. In dry years the number of zones with "critical" fuels generally increases, and so does the number of warnings. The Red Flag criteria have changed several times since the 2000 fire season and are not necessarily comparable.

The 2012 fire season in Southeast Idaho got off to an early start owing to a below normal winter snow pack that peaked around the third week of March (about 2 weeks early), above normal temperatures, and a high number of days with either strong gusty winds and low relative humidity; or thunderstorms and lightning. Local vegetation entered the "green-up" period earlier than normal followed by earlier than normal curing of local fuels. Lightning activity was judged to be significant on 23 days this season, compared to an average of 7 days since 2000 (Figure 2.8) and accounted for 93 of the 174 warnings (events) issued. There were at least two days when very pronounced smoke column development was observed on local wildfires in conjunction with a high level Haines Index of 6. The Weather Forecast Office in Pocatello achieved a probability of detection of 0.90 but this was offset by a false alarm rate of 0.25 this year.

5.2 Spot Forecasts prepared by WFO Pocatello:

Wildfires	152
Prescribed Fires	148
HAZMAT	0
Backup	0
Exercise	0
Search & Rescue	1
Total	301

Verbal Phone Briefings	
For fire support	97
Search & Rescue	1
Emergency management	10
Exercise	0
Total	108

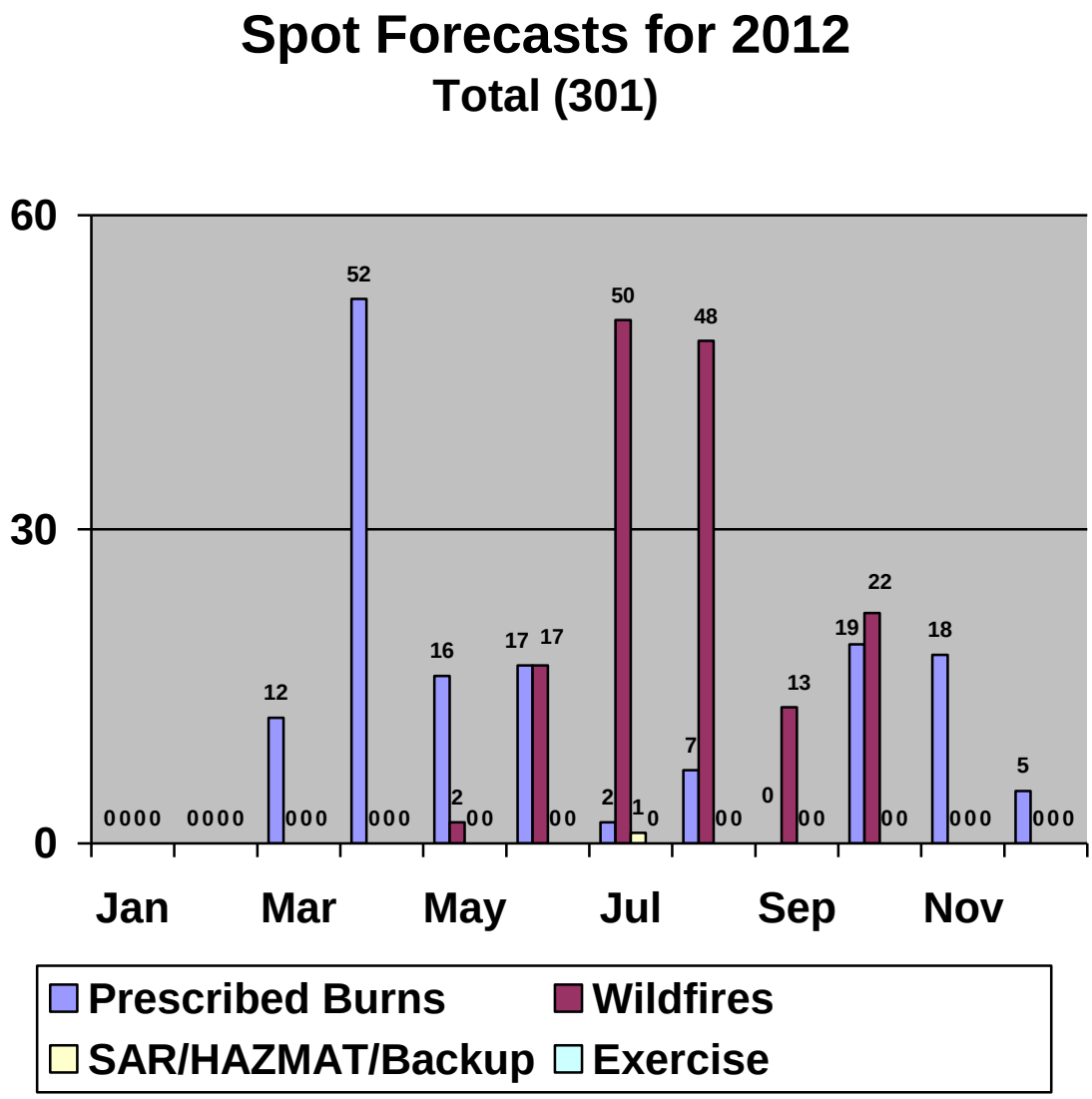

Figure 5.3(a) Spot Forecasts prepared by the Pocatello Fire Weather District during the 2012 fire season.

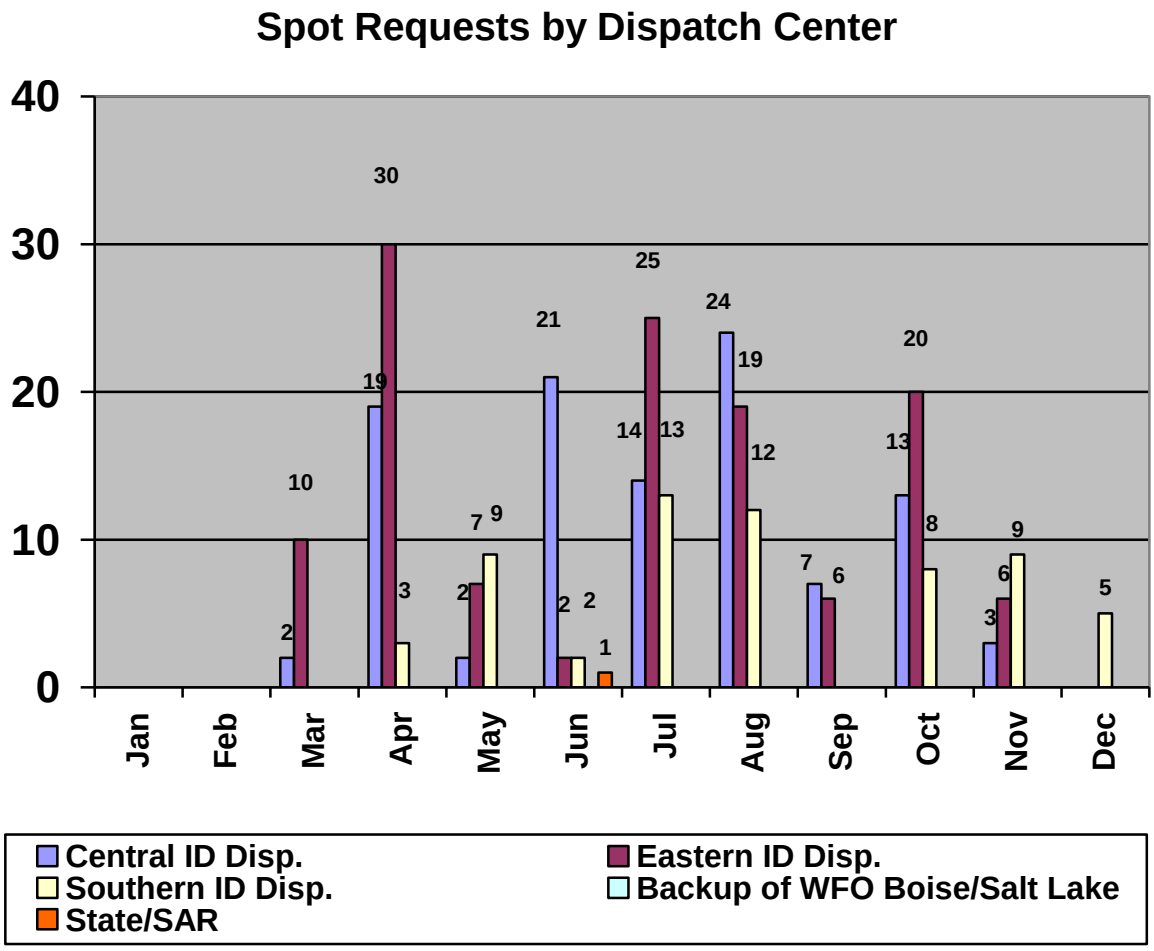

Figure 5.3(b) Spot Forecasts requested by dispatch area during the 2012 fire season in Southeast Idaho.

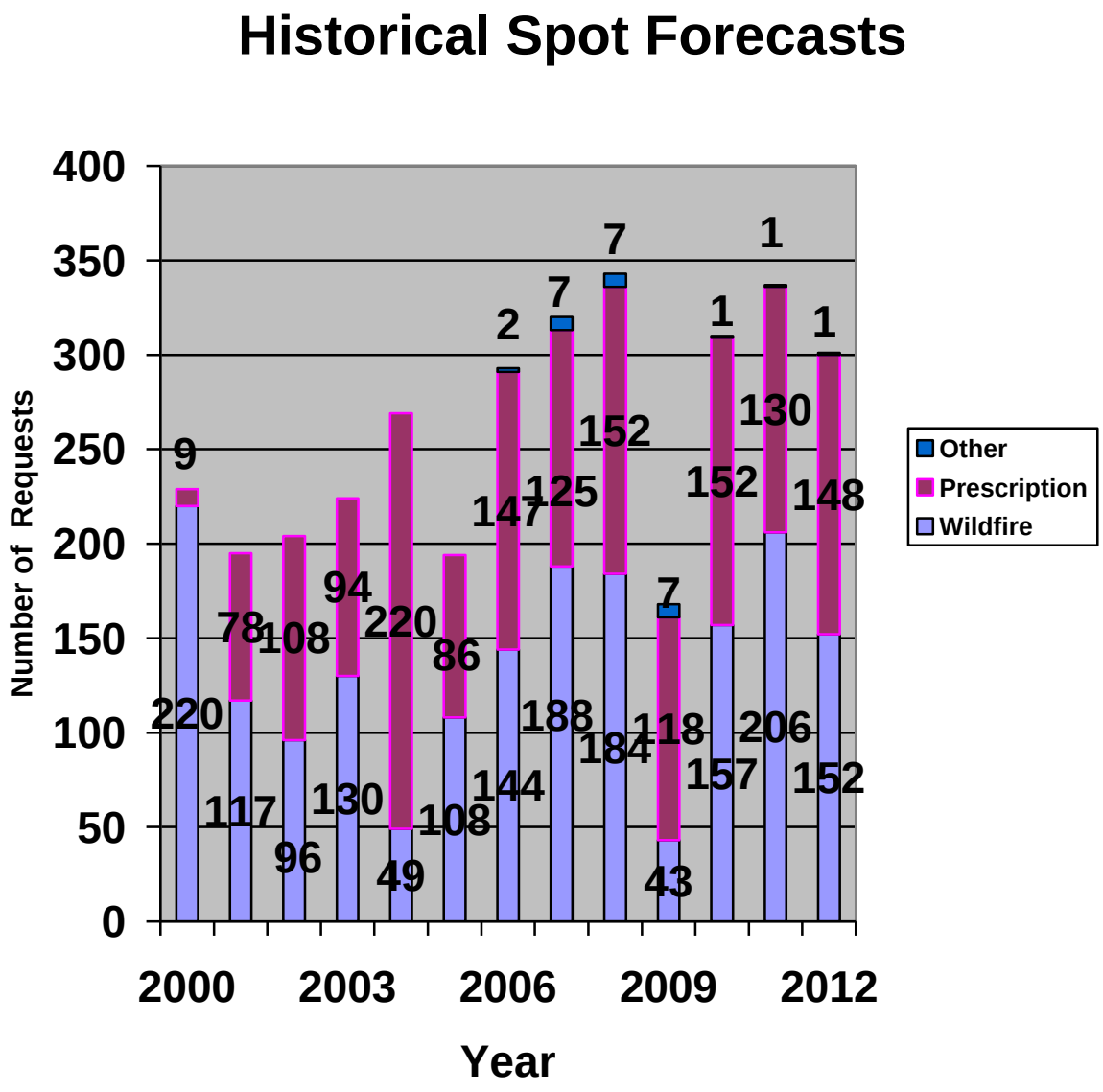

Figure 5.4 Historical trends in Spot Forecast requests for the Pocatello Fire Weather District. There were 301 SPOT forecasts provided in 2012. The record for the National Weather Service Office in Pocatello is 347 SPOT forecasts in 2008.

5.3 Fire Dispatches Supported by WFO Pocatello: There were five IMET dispatches this fire season resulting in 49 man days served out of the office.

Date	*Dispatch Location*	*Type I Incident Meteorologist*
June 23 to June 29, 2012	Dump Fire Utah Division of Forestry Near Saratoga Springs, Utah	Jack Messick
July 01 to July 07, 2012	Wolf Den Fire BLM, Vernal Field Office, Green River District 45S Vernal, Utah	Bob Survick
August 01 to August 16, 2012	Halstead Fire Challis NF (River of No Return Wilderness) Near Stanley, Idaho	Jack Messick
August 28 to September 12, 2012	Halstead Fire Salmon-Challis NF Near Stanley, Idaho	Jack Messick
September 6, 2012 to September 8, 2012	Mustang Complex Salmon-Challis NF 4W of North Fork, Idaho	Bob Survick

Table 5.3a Type I Incident Meteorologist Dispatches by WFO Pocatello (in support of onsite IMT operations).

Date	*Dispatch Location*	*Type II and III Incident Meteorologist*
June 28 and June 29, 2012	Charlotte Fire ICP Support and briefings Pocatello, Idaho	Vern Preston, Rick Dittmann
`January 30, 2012	South Central Idaho Health District Exercise	Vern Preston
February 1-3, 2012	Idaho Earthquake Search and Rescue Exercise, Evacuation, and Mass Casualty exercise.	Vern Preston

April 9-11, 2012	Idaho Earthquake Search and Rescue, Evacuation, and Mass Casualty exercise – full scale.	Vern Preston
May 7, 2012	EAS Activation exercise	Vern Preston
May 25-26, 2012	Pre-Briefings for Shoshone-Bannock Nuclear Transportation Media Day and Seminar.	Vern Preston
June 6, 2012	EOC Communications Functioal Exercise Soda Springs, Idaho	Vern Preston
June 21, 2012	LEPC Mass Casualty Table Top Exercise Power County, Idaho	Vern Preston
July 31, 2012	Halstead Fire NIMO In Briefing Stanley, Idaho	Vern Preston, Dean Hazen, and Jeremy Schultz

Table 5.3b Type II Incident Meteorologist Dispatches or local support by WFO Pocatello (at an Emergency Operations Center, Area Command, or Joint Field Office location).

5.4 Training: WFO Pocatello staff participated in the following training courses during the 2012 season.

Forecaster	Training situation
Bob Survick and Jack Messick	RT-130, BLM Pocatello Field Office, March 19, 2012.
Bob Survick and Jack Messick	IMET Internet Technology teleconference, March 29, 2012.
Bob Survick	Pre-Fire Season Station Meeting for all forecasters, National Weather Service Office, Pocatello, Idaho May 8, 2012.

Mike Huston	Instructor S-290 Intermediate Wildland Fire Behavior, May 8-9, 2012, Snake River Hot Shots, Pocatello, Idaho.
Mike Huston	Instructor S-290 Intermediate Wildland Fire Behavior, June 4-7, 2012 at the Eastern Idaho Technical College, Idaho Falls, Idaho.
Rick Dittmann	Staff Ride, Cramer Wildfire of 2003, near Salmon, Idaho, June 25-27, 2012.
Bob Survick	IMET Training/Conference Call, Earth Networks Incorporated (ENI) Lightning Data, October 12, 2012.
Bob Survick	IMET All-Hands Conference Call, Tuesday October 16, 2012.
Bob Survick	Conference call with Predictive Service, WFO Salt Lake, WFO Albuquerque, and WFO Flagstaff concerning the Eastern Great Basin Lightning Study and Red Flag Warning criteria.

5.5 Field Visits: The staff at WFO Pocatello participated in 19 interagency meetings this year.

Location	Dates
Gate City Interagency Fire Front Meetings, Pocatello, Idaho	Monthly
Local Emergency Planning Committee Hydrology Vern Preston, Corey Loveland	10 meetings
Ground Hog Day Chili Cook-off Southeastern District Health Office Pocatello, Idaho	January 27, 2012
South Central Idaho Interagency Coop/FMO Meeting South Idaho Interagency Fire Center Shoshone, Idaho Bob Survick	March 27, 2012
Spring Operations Meeting Eastern Idaho Interagency Fire Center Idaho Falls, Idaho Bob Survick	May 8, 2012

Cramer Fire Staff Ride — June 25-27, 2012
Central Idaho Interagency Fire Center
Salmon, Idaho
MIC Rick Dittmann

Eastern Great Basin Predictive Services — October 29-30, 2012
And National Weather Service
Post Season Meeting
Via teleconference this year
MIC Rick Dittmann, Bob Survick, and
Jack Messick

Orientation Visit for new staff — September 6, 2012
Central Idaho Interagency Fire Center
Salmon, Idaho
And Mustang Complex ICP
Bob Survick, Jeremy Schultz,
Elizebeth Padian, John Hinsburger

5.6 Support to IMETs dispatched to the WFO Pocatello area of responsibility:

Mark Loeffelbein, WFO Missoula Cave Canyon Fire (Minidoka Complex) 8/6-15; Mustang Complex, 8/23-9/7, 2012

Bob Nester, IMET, WFO Missoula, Mustang Fire, 8/10-25, 2012

Byron Paulson, IMET, WFO Minneapolis; Halstead Fire, August 14-29, 2012

Stefanie Sullivan, IMET(T), San Diego CA, Halstead Fire

Mark Taber, IMET(T), Burlington, VT Mustang Fire 8/12-27 and 8/30-9/4, 2012

Chauncy Schultz, IMET(T), Billings MT, Halstead Fire, 8/22-9/3, 2012

John Fox, IMET(T), Spokane, WA Halstead Fire 9/3-17, 2012

Mark Struthwolf, IMET, Salt Lake City UT, Halstead Fire September 10 to September 24, 2012.

Andy Haner, IMET, Seattle WA, Mustang Fire September 8 to September 23.

John Pendergast, IMET, Melbourne FL, Mustang Fire September 21 to 29, 2012.

Larry VanBussum, IMET, NWSHQ-Boise, Mustang Fire September 28 to October 7, 2012.

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